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AIR WONDER STORIES

MARCH
1930
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by EDWARD E. CHAPPELOW

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On the Cover This Month

is shown a scene from Edward E. Chappelow's story, "The Return of the Air Master." We see the Air Master's craft cutting a neat hole through the roof of a building and drawing up some of its contents by means of his gravity nullifying ray. The airship is surrounded by a haze of its own making.

NEXT MONTH

EVANS OF THE EARTH GUARD, by Edmond Hamilton. Mr. Hamilton gives us another of his remarkable aviation interplanetary stories. If interplanetary travel ever comes to pass, it will bring with it many problems which must be settled by our best scientific and technical genius, and the men who will handle these problems must have the highest order of courage, ingenuity, and scientific knowledge. Mr. Hamilton shows in his own inimitable way how some of these problems may be met.

THROUGH THE METEORS, by Lowell Howard Morrow. One of the greatest obstacles to interplanetary travel is undoubtedly the menace from meteors. These wanderers of space travel from ten to thirty miles a second, which makes them capable of battering their way through any type of armor we now have. Even small meteors present an ever present hindrance to space exploration, and the large meteors, sometimes hundreds of feet in diameter, are menaces that our present scientific knowledge has no means of combating. But Mr. Morrow has a solution and he gives it to us in this story.

HOW HIGH CAN MAN FLY? by Lt. Apollo Soucek. Our writer, recently the holder of the world's altitude record, gives in this illuminating article some of the conditions that limit the height to which airplanes can ascend. Lt. Soucek has the advantage of not only being a technical expert, but also a flyer of the highest order. We are indeed fortunate in being able to present Lt. Soucek's ideas to our readers.

THE FLYING LEGION, by George Allan England. We come now to the final installment of this masterpiece of aviation science fiction. We have been literally flooded by letters commenting on the science of this remarkable work by our well-known author. We will now see how the Master plays his final card in his amazing exploration of unknown lands; and though we agree with him or not in the purpose of his exploration, we cannot help but admire his mastery of a very difficult problem.

AND OTHERS.

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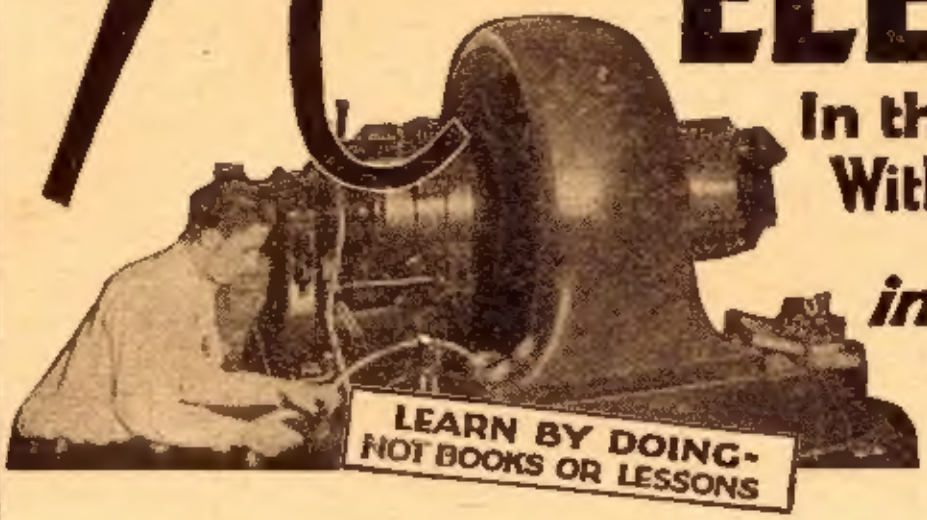

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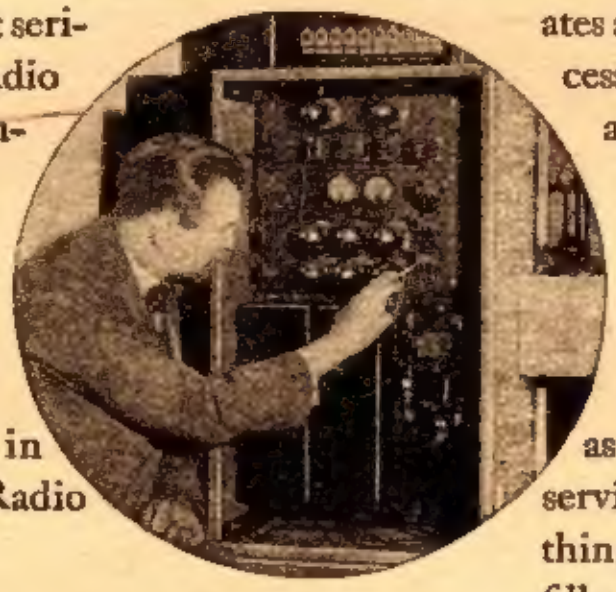

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VOLUME 1
No. 9

AIR WONDER • STORIES

MARCH
1930

The Future of Aviation Springs from the Imagination

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These aeronautical experts pass upon the scientific principles of all stories

FUTURE AVIATION PROBLEMS

By HUGO GERNSBACK

ALTHOUGH aviation has advanced with rapid strides since the memorable experiments of the Wrights, we are still a long way from perfection; and a tremendous amount of work remains to be done. And, while the airplanes of today may be said to be fairly safe, our engineers and scientists will have to cover a tremendous ground during the next twenty-five years, to make airplanes as universally used as the automobile is today.

But let no one doubt that, inside of twenty-five years, aviation will have become as popular as motoring is today, if not more so. With the exception of fog, weather conditions today are no great deterrent to flying.

Perhaps the most important problem that will be solved during the next twenty-five years is that of fog. Some progress has been made but it is not enough. We now have powerful neon lights at almost all our large landing fields; but, though neon light penetrates an ordinary fog quite well, it is useless in the exceedingly heavy fog blankets, which are not unusual in many parts of the world.

Some years ago, Sir Oliver Lodge did some experimenting with electrical fog-dispersing apparatus and here, doubtless, the solution lies. It is possible to dissipate fog electrically, by means of high-tension currents. We can see the future landing field equipped with a number of huge towers which, by throwing out electrical energy, can clear it of any fog in short order. No doubt such equipment will be expensive; but, since we deal with the problem of safeguarding human life and making aviation more perfect, it will be a small price to pay.

The same purpose can be accomplished, although not so perfectly, by means of the radio beacon.

There has been quite a good deal of experimentation along these lines, particularly in France, and the principle employed has a good deal of merit.

One of the best methods is that wherein a cable or wire is stretched over a number of miles of an airlane leading from the landing field. This wire is energized with radio-frequency impulses, which leave the wire and produce a directional field, which extends quite a distance above the earth. A small signalling apparatus in the airplane serves to inform the pilot whether or not he is deviating from the correct route.

Another system creates an electrical field, directly above and in the vicinity of the landing field; so that, even in the fog, the aviator may know, by means of his radio indicating apparatus, when he is directly above the field and can glide down to safety.

Another system, on which our Department of Commerce has been working for years, utilizes twin transmitters, whose signals neutralize each other along a sharply-defined airway. In this case also it makes no difference whether the aviator is flying in total darkness, fog, or rain; because, the instant he deviates to the right or to the left, he will be apprised of the fact by a signal inside of the cabin, so that it is almost impossible for him to lose his course.

Of course, these various radio systems, though they have considerable merit, are far more expensive than either the lighting equipment or the fog-dispersing method indicated above; and it remains for the future to tell which has the greatest merit.

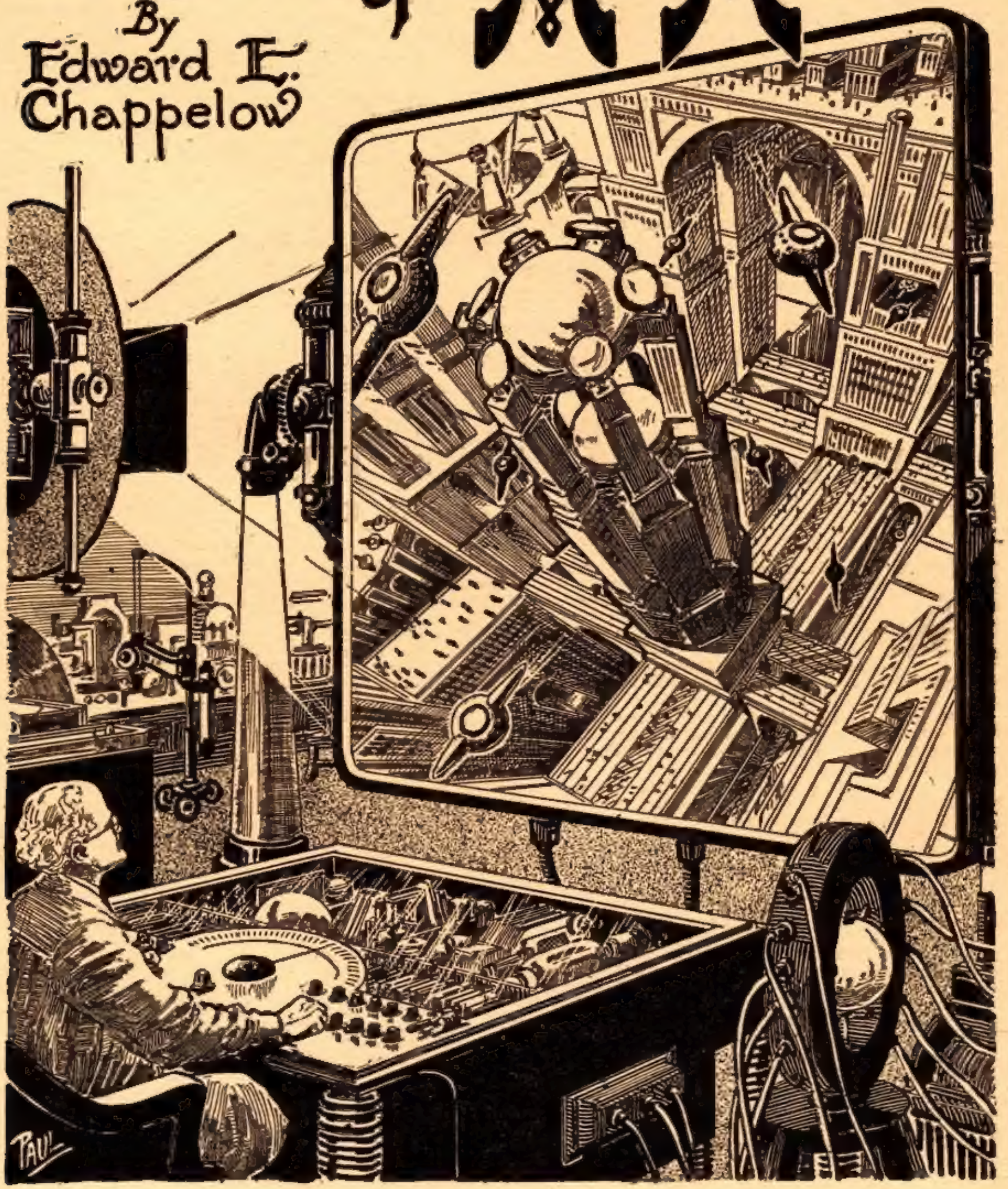
There is no doubt also that, in the not-too-distant future, it will be possible for a pilot to use television in some manner. It is possible today to send and receive television impulses by radio; and there is therefore no good reason to believe that they cannot be used to convey landing instructions. For instance, a ground crew at the landing field might show the distant pilot, by means of television, the conditions on the field as he would find them; and, if the television impulses were transmitted in their natural colors, such a scheme would be of great help to an aviator.

There remain problems of handling aircraft in limited spaces; such as for instance, lighting on top of large buildings, battleships, and the like. Till the hovering flight has been mastered, we must have recourse to other means of stopping airplanes quickly without causing havoc to their construction. Many schemes have been proposed; none, however, are quite satisfactory.

Many years ago, the writer proposed and patented a scheme wherein large electromagnets were to be sunk into a plane surface, which would be located on top of the building on which airplanes were to land. The planes would be equipped with steel skids which would be engaged, electrically, by the fields of the magnets, when powerfully energized, and thus produce a braking action. The strength of the magnetic field, controlled by the land operator, would determine the speed at which an aviator could make his landing. While the scheme has not yet been tried out, it may be of value during the next twenty-five years; unless, of course, hovering flight is successfully demonstrated, when devices such as that described will no longer be necessary.

The Return of the Air Master

By Edward E. Chappelow



(Illustration by Paul)

A cluster of mighty towering buildings filled the lower portion of the picture and aircraft of freakish and undreamed-of shapes and sizes flew among the great buildings. Vivid beams and rays cut the air in every direction.

THE RETURN OF THE AIR MASTER

ON the morning of the 19th of April, 1986, the London newspapers appeared on the streets with the blazing headlines: "Second Air Torpedo Disappears." The news caused no little interest among the throngs of people on their way to work, but none were more interested than Detective Albert Riel, famous operative of Scotland Yard, who, noticing the large headlines as he passed the newsstand on his way to the office, bought a copy and read the entire article as soon as he was seated at his desk.

The newspaper account read as follows:

"Visophone reports from New York state that air torpedo 47A of the Torpedo Air Express Co., which left that city for London at 1.15 this morning, has mysteriously left the beam and disappeared. Signals from the torpedo's automatic signal transmitter stopped at 2.20, which would place the air liner at approximately 400 miles at sea. Although swift search planes were sent out from New York immediately after the signal ceased, they have found no trace of the missing cruiser. The entire ship with its ninety-two passengers and crew of twenty are given up as lost, and police planes are searching the surface of the ocean for clues of the disaster.

'This is the second tragedy that has occurred to that line within thirty days, the torpedo 63A having disappeared in a similar manner on the 26th of March. The American and British governments are co-operating in an attempt to determine the cause of the two disasters, and it is rumored that the line may be closed down until the case is fully investigated."

A slight frown knitted the brow of the famous detective as he laid down the paper and looked at his young assistant, Jim Rogers, who was seated opposite him.

"Well, Jim, your wish to get on a big thing has been granted you, for we start on this Torpedo Express case right away."

"But you don't think that the torpedoes were forced down by bandits, do you?" asked Jim, taking a great interest in the subject.

"That is my opinion."

"But the general belief is that the mechanism of the ships must have failed, or else the liners were struck by lightning, for the last one is reported as having been flying through a stormy area at the time it is supposed to have left the beam. If that is the case, there won't be much work for us."

"My opinion is different," replied Riel, settling back in his chair. "I am positive that this is a continuance of a case that I worked on four years ago, in which the master crook escaped."

"What? Do you think that—"

"That the Torpedo Air Express case means a renewal of my fight to run a mad scientist to earth."

"But how do you connect the old wizard with this?"

"Four years ago, the liners of the International Air Line were being brought down over the ocean and robbed by Jolsen, this scientific criminal, who used a telepathy ray to overpower his victims and so caused them unconsciously to do as he wished, by putting into their brains orders that he wanted obeyed. That telepathy ray was a deadly weapon, especially in the hands of a maniac. However, we found a way to protect ourselves from this ray, and under this protection raided his base before he had much time to do any damage with it. But although we destroyed his laboratory and instruments by our air raid, the man himself escaped in a submarine. Since then he has not been heard of, although some of the world's best men have been continually looking for him, until a few months ago, when a warehouse in Bristol was raided and plundered in a mysterious manner and a great deal of material stolen; and again later when the first torpedo liner disappeared. This Torpedo Air Express Co. is the former International Air Line system, the name having been changed since they did away with the huge plane cruisers after developing the present bullet-shaped torpedo that can travel five hundred miles an hour, or fully a hundred miles an hour faster than the other type. Since the disappearance of the wizard, I have been kept constantly on the case, watching for the first clue that would indicate any activity on his part, and have prepared against any other such attempt against mankind as he made before. Although working on other cases at times, I have been carefully preparing for another clash with the master mind, which I felt sure was coming. But not until six months ago did I get the slightest trace of him. Since then, however, I have had proof that he is active again. First was the robbing and burning of the Empire Electro-chemical great warehouse at Bristol. An investigation into this proved beyond a doubt that the telepathy ray was used. It also gave me reasons to believe that he is equipped with instruments and devices that we know nothing of. Also, disturbances detected on the air at times while I used the visophone, I am sure, were caused by the man listening in. And then the mysterious disappearance of the two torpedoes was undoubtedly the work of this man and shows us that the

EDWARD E. CHAPPELOW

IN this remarkable story, which is Mr. Chappelow's sequel to "The Planet's Air Master," we are permitted to see in more detail, what the world will have to face if a phenomenal scientific intelligence determines on anti-social action.

It is obvious that our utilization of the possibilities of nature is only beginning; and, in the field of aircraft, for example there are unlimited possibilities which have not been touched at all.

The Air Master must not at all be considered as a freak or impossibility. Already we have bandits of one kind or another who use the air extensively; and it only remains for a master mind to do on a great scale what has already been done on a small scale.

Mr. Chappelow has further delved penetratingly into many of the possibilities inherent in control of distant things by radio; and it is not rash to predict that many of his instruments will see the light before many decades have passed.

wizard is coming out into the open. He has no doubt barricaded himself behind a mass of scientific apparatus and is about ready to tell the world to bow to him, and look to him as the one and only ruler of the earth. The time has come for us to take action Jim. Now signal to the roof attendant and have him call an air taxi. We will leave for my home immediately, for the time has come when the safety of the world depends upon the immediate extermination of this man."

It was scarcely nine o'clock when the swift taxi plane swung down onto the landing square at the home of Detective Riel on the edge of the metropolis, and a moment later the detective stepped out, followed by his assistant.

"We'll get inside of the house at once," the sleuth directed as he hastily paid the fare. "From this moment on we must take every precaution, for we are dealing with the world's cleverest and coolest man. The fate of civilization may depend upon our ability to match wits with this man."

Upon reaching the sleuth's house the men at once entered Riel's study, a large room which the detective called his "combination" room because of its unusual furnishings. Here the famous detective kept his mechanical assistant, a complicated switch-board containing many electrical instruments and detecting devices, that no one, beside himself and Jim, knew very much about. Also in this room was his well filled bookcase and comfortable sitting chairs with their individual smoking stands that were always well stocked with smoking material. Motioning Jim to one of the chairs, the detective at once walked across the room to the far end where the neat but complicated switch board was located and, pausing at the desk which sat facing the control board a few feet from it, pressed one of a dozen buttons that were mounted near the right side of the desk. He then stepped up to the mass of complicated controls on the panels and quickly made a few adjustments.

"I suppose you will keep the magnetic screen around the house continually now," young Rogers said, noticing his leader adjusting the controls, "in order to prevent the wizard from seing into the house with his visoray."

"Yes, I have just turned on the magnetic screen for that reason, but I doubt if it will assist us much in keeping our actions and conversation secret. Our crook probably has more powerful and deadly devices at his service now than we can match at our best. This will undoubtedly turn out to be a game of wits against science."

Conversation was here interrupted by the entrance of the butler, in answer to the detective's ring.

"William," instructed the sleuth, addressing the butler, "Mr. Rogers will be my guest for some time. Please make accommodations for six police officers. From now on the house will be under constant guard."

"Why the police guard?" asked Jim after the butler had gone. "Do you think that the wizard will have men operating in this city?"

"I am the man's deadliest enemy, knowing more about him and his ways than anyone else. It is therefore possible that he may wish to do away with me in order to increase his chances of reaching his goal, which is to control the entire earth and dictate to every living man. Therefore, if he is unable for some reason, to kill me by means of his rays or other apparatus, he may enlist the services of other people to do the job, and by getting them under the power of his telepathy ray, cause them to attempt to murder me. It is not that I fear so much for my life, that I take these precautions, for I have run risks greater than this before, but it is because the fate of the whole world will probably depend upon my ability to bring this man down. So we must protect our lives with the utmost care for the sake of the world in general."

Going to the desk, the detective seated himself and picking up the visophone unit, pressed a small button at his elbow. Soon the reflector plate lit up before his eyes. A moment later the face of a young lady filled the screen, and a feminine voice came from among the controls on the board.

"Connection."

"48A zone 92," the detective spoke into the unit.

A New Ray

THE visophone plate went blank for a moment, only to light up again showing the interior of an office and a man seated at the desk.

"Air Beam station 23," the man spoke into the instrument on his desk.

"This is Detective Riel of headquarters speaking," the sleuth replied, "I have been assigned to the task of investigating the loss of the two air torpedos while travelling on beam 23, which is supplied by your station."

"Our entire system is at your service in this work, Mr. Riel, and if we can assist you in any way, I trust you will let us know."

"It is of importance that I see the graphic charts of your beam, taken at the time of the two disasters, and it would also be of great help to me to know what the contents of the cargoes of the two ships were. It would be best if you could send one of your officials out to my residence this morning, so that we can discuss the case and make plans for the future. It is my opinion that your line is in no way responsible for these tragic losses, and your co-operation with me in this work will, I am sure, hasten the time when I will be able to prove it."

"Very well, Mr. Riel, we will have a man fly over immediately with the charts, and as soon as we trace the shipping lists of the lost cargoes, I will have you called. By the way; what is your landing design?"

"A triangle of green within a circle of white. Drop to the landing level at descent lane number forty-seven."

"All right, Mr. Riel, we'll have a man leave immediately."

"Well, Jim," the detective looked up at his assistant as he shut off the visophone, "you used to wonder why I took so much trouble to show you how to operate the instruments on this board, but the time is here when your familiarity with the control board makes you a valuable man to me. Now call up headquarters with the Triple Wave transmitter and have six officers sent out here at once. While you are doing that, I'll watch the chemical ray detector, the only new instrument that I have added to the board since its construction five years ago."

In a few moments Jim had made the call and, shutting off the set, looked up at Riel who was examining the new ray detector.

"The officers will leave immediately for here," he informed his superior.

"Jim,"—the curt tone of the detective made his assistant jump. "Call headquarters again. Give the important message signal, and say that no more torpedos are to be sent on beam 23 until further notice from me. Cut out the visophone system and the Triple

Wave receiver before you make the call, and send the message on settings 9-4-8."

With swift fingers, Jim cut out the unnecessary instruments by switching off the power source that energized them, and again called headquarters. Waiting about six seconds, he sent out the combination call letters 9-4-8 and rapidly changing the controls of his own transmitter panels to the new setting, paused again for a few moments, to allow the receiving party time to adjust their set to the new call signals. After a few brief moments of waiting, Jim spoke the message into the voice transmitter. As he repeated the message a second time, his companion divided his attention between watching the old and new ray detecting devices.

"That's a pretty good start, Jim," he smiled as the Rogers shut off the set.

"But what's up? Why all the excitement?"

"I was just checking up on the wizard's equipment."

"With that?" Jim pointed to the new chemical ray detector.

"Yes. For the first time, I am positive that the old man is using a brand new ray.

"Four years ago," the detective continued, dropping into a chair, "The wizard used a super magnetic vision beam, and we were able to detect it with ease, using such instruments as a compass within a coil, a galvanometer, a wireless reception unit and other ordinary magnetic detectors. But lately I have been unable to detect any ray of his although I was positive that he was active and probably using one. Deciding that he might be using a beam of different make-up, a ray that we knew nothing of, I determined to try and see if I could detect one, and decided that a chemist by the name of Dr. Forrest was the man to help me. I soon had him experimenting with chemical mixtures while I intermittently sent messages to headquarters on the Triple Wave transmitter or used the visophone.

"I was sure both were tapped by the wizard by having his instruments set to the same adjustments as mine so as to receive all messages that I sent out or received. Finally, Dr. Forrest made a discovery by combining chemical experiments with electrical ones, and produced this detecting device here—which is simply a bowl containing a chemical mixture, with a compass and a coil enclosed in a glass sphere, immersed in the chemical. The waves of the ray that our man is using, pass through the chemical and are filtered in some way, and the magnetic properties of the beam are freed from the neutralizing power of the ray.

"Passing through the chemical, the mysterious properties of the ray are, for some reason, unable to penetrate through the liquid, or else are destroyed by the chemical, while the magnetic contents of the beam are unaffected by the liquid. In this way, the coils of fine wire in the hollow glass that is immersed in the chemical, are subject to the effects of the now liberated magnetic forces, and are energized by the slight potential impressed in them, and the compass needle, balanced between the coils, is drawn out of its position by their pull. It is also possible to tell by the action of the compass needle what direction the beam is coming from, and, if desirable, use this means to trace it to its source. However, for us to try that would be just a new way of committing suicide. We would never get near the device that projected the beam. The present detecting instrument is in reality the same detecting device that I used on him before, with the exception that the ray must be passed through the chemical before it can be detected.

"I received this device last week, but until now have not had a chance to use it. But when you called headquarters a few minutes ago, I noticed the compass needle of the chemical detector become disturbed and I had you send another message to enable me to further watch the detector's actions. I knew that the important message signal would attract him, if it was really the wizard, and that he would tap our message and attempt to get information as to our moves. It worked, and the chemical detector was again disturbed. The new chemical instrument was agitated while the old magnetic detector remained motionless on the board. I made you send that second message to find out something about the man, and I found it out. In other words, Jim, we have learned this much; first, that he has not got a Triple Wave wireless receiver as I had really believed until now. Second, that the ray that he is using is a vision ray. Third, that for a certainty his ray is of a nature that we know nothing about, with the exception of how to detect it. Fourth, that he is positive that we cannot detect this new ray of his. The fifth thing that we just found out is that he knows that I am aware of his activity and am out to get him, while the sixth and most important discovery is that although we can detect his ray inside of the house, still, in passing through the magnetic screen around the building here his ray is rendered useless as a vision ray. In other words, we are free to move and act without fear of being seen by his new vision beam as long as we keep the high frequency field around the house."

Riel's Theory

"NOT bad for a start," Jim commented, "But I'd like to know why you think that he has no copy of your Triple Wave receiver, or what makes you so sure that he can't see through our magnetic screen."

"All right, then I'll tell you. The fact that he uses the ray whenever we communicate with headquarters, as he did both times that we used the Triple Wave transmitter just now, shows us that he has a device that tells him whenever we use the set. But the fact that he keeps the ray on London here, all the time that we are using it to communicate with the downtown central office, shows us that he has to get our message by means of the ray and not by means of any receiving device at his base. He undoubtedly has a reception device tuned to the same wave as one of our three wave lengths which enables him to tell when we use the set.

"As you know, there are but two Triple Wave receiving and transmitting sets in the world, one complete set is installed here on this board and the other in my office at headquarters, downtown. I own all rights to the device, having been presented with them by the inventor, who is a friend of mine, to enable me to communicate with headquarters secretly, while I was working against the wizard before. However, old Jolsen, the wizard, succeeded in getting a copy of the drawings of the device by means of his telepathy ray, and built a duplicate set by which he was not only able to overhear my messages, but used it to send me threats in the hopes of scaring me into submission. That set was destroyed along with what plans he had of it, when his base was bombed, and the only way that the man could have built another set, would have been to carefully study the construction of one of mine with his viso-ray. This he could not do until he had built equipment to produce another ray, and which even then was a slow uncertain task of tracing all the parts and pieces

of wiring. There was no way for him to purloin another copy of the drawings. I made sure of that by destroying all available plans of the device. As to the possibility of his having memorized the construction of the other set that he built, that is impossible. No man could so memorize the many parts, connections and adjustments that are necessary in the construction of a Triple Wave receiver. So it is quite possible, that he would decide that it was not worth the time and trouble to construct another such receiving device just to overhear my conversations. I believe he undoubtedly thinks that as his new ray will not produce magnetic effects or disturbances in any way he can watch the set at my office and see the messages that it receives without betraying himself in any way."

"Then all we have to do is protect it with a high frequency magnetic field, like we have around the house here and which you say renders this new ray useless."

"We could keep our messages to headquarters secret that way, yes, but we won't. We will let him read the recording paper of the receiver at the office downtown whenever he likes, and we may be able to use it to our own benefit. Anyway, we will work that out later. We must remember though, that we cannot use the set to send out communications that we wish to keep from him."

The conversation was here interrupted by the entrance of the butler.

"Mr. Graham of the Torpedo Air Express Co. to see you sir," announced the man.

"Show him in immediately, Williams," directed the detective. A moment later he was shaking hands with the official.

"You certainly lost no time in coming," Riel smiled, "It is scarcely more than half an hour since I called your station."

"There was nothing to delay me, Mr. Riel. I was at the station when the superintendent instructed me to come out here and discuss the case with you. All I had to do was get the charts from the chief switchboard operator and leave immediately."

"My purpose in having you come here," Riel at once approached the subject of interest, "was in order that we might talk things over in private. Now before I go any farther, I want to assure you, Mr. Graham, that I am in no way holding your beam or station responsible for the tragedies that have happened. I have uncovered clues that make me positive that your line is being tampered with by criminals. But I want you to promise that you will not allow this to become known publicly, for it will be to my benefit if the true facts of the case do not become known for the present."

"I give you my word of honor, Mr. Riel. Outside of the highest officials of the company, no one shall learn from me anything concerning the subject."

"Very well. Now, suppose we look at the graphic charts that you brought with you."

CHAPTER II

Plans

GRAHAM quickly produced the charts from his brief case, while the others drew their chairs up closer to his.

"This graphic reading," commented the official, unfolding one of the papers, "is the one showing the reading of our beam taken at our London station on March 26th during the ten minutes that the torpedo was supposed to have left the beam."

"If I am not mistaken," Riel stated, taking the chart from his guest, "You use two stations to each beam."

"Yes, a radiating station and a negative or reception station. The one that supplies the positive pressure to the transatlantic beam number 23, is located in New York, while our London station at the east end of the beam, supplies the negative charge."

"You say that your London station produced this chart reading?" the detective asked examining the paper closely, and without waiting for a reply continued, "This chart shows a reading of 28,000 volts for three minutes then a sudden drop to zero for four and a half minutes followed by an equally sudden return to full pressure. Does this mean that the beam actually broke for four and a half minutes, and that your pressure meters dropped to complete zero?"

"Yes. Here is another chart taken at the same time by the New York station of the same beam. This chart, as you see, Mr. Riel, shows a continuous pressure being applied to the beam during the time that the meters at our station here dropped to zero for a few minutes and again returned to normal reading. In other words, these two charts show that constant potential was applied to the beam but not received at this end, which indicates that in some way the beam must have broken between the two stations."

"And the reading of the beam during the disaster last night was similar to the previous one, I suppose?"

"Exactly. Our beam acted the same as it did before, with this exception—that the energy dropped for scarcely three minutes this time, while New York claims to have kept a constant pressure on the beam during the disturbance. It is this sudden dropping of the beam energy that leads us to think it was struck by lightning and temporarily grounded by the discharge or unusually heavy static conditions in the atmosphere caused a similar breakdown, either of which would have caused the torpedo's automatic equipment to become useless. But then again, in such a case, the operators could have easily handled the ships by means of the emergency controls. The only reasonable explanation that seems to hold, is that the torpedo itself was struck by a lightning discharge. Even this, however, seems to be a pretty frail explanation."

"Suppose the liners did leave the beam at the time that the energy dropped at the receiving station, just where about over the ocean would each of them be?"

"The 47A, which is the torpedo that disappeared last night, left New York at 1.15 A. M. according to official reports from the American office, and the trouble occurred at 2 20 A. M. So it can be estimated as being about 375 miles out from New York at the time of the trouble with the beam."

"And the other torpedo, how far out from the American coast was it when the beam broke?"

"The 63A was a Chicago-London ship, and left Chicago on a through beam, that is, it did not stop at New York, but travelling on the Chicago-New York beam which connects with the transatlantic one over New York City, the ship continued right on over the ocean as tho on one continuous beam. According to the signal ray which taps the transatlantic beam over the city, automatically receiving a signal each time a torpedo passes along the beam, the 63A passed over that city east bound at 11.15 P. M. and at 12.05 P. M. by their time, the break in the beam was registered at our station. It seems both torpedoes were approximately one hour out from New York, so the two accidents must have happened in the same area."

"Isn't 28,000 a little higher than government regulations allow?" the detective asked, referring to the pressure ratings as indicated on the charts.

"The regulations allow an average pressure of 26,000 volts and a maximum of 30,000. This apparently wide range of pressure ratings is necessary, due to the beam's being so sensitive to, and easily affected by, changes in weather conditions. In dry clear weather, our torpedoes function best when we use a pressure of about 24,500 volts applied to the beam, while again, when the atmosphere is damp and foggy, the leakage of the beam becomes so great that the full 30,000 volt pressure allowed by the government is necessary to maintain a beam of sufficient strength to do its work."

"Your information, Mr. Graham, has been of great assistance to me. It has given me further reason to believe that your line is being plundered by the cleverest criminal in the world today, the man who so successfully robbed your line a few years ago."

Forrest Enters

"DO YOU think that that clever scientist is doing this?" gasped the surprised official.

"I am almost positive. However, it is impossible to tell how things will come out at present. There is a slight chance that something else is creating all this trouble, but I have proof that he is active again and everything points in his direction. Now, I have arranged to have you continue operations as usual with the exception that you carry only passengers from now on. I am sure that you will experience no further trouble from this source as long as you carry no mail, parcels, or freight."

"I am sure that the management of the company will feel very grateful to you, Mr. Riel," Graham replied, rising and shaking the detective's hand. "Not only for the prompt and sincere way in which you are attempting to clear up this baffling problem, but also for your work in preventing a shut down of our line while a solution to these disasters is being sought. However if we thought that there was the slightest danger of another such tragedy, we would certainly not continue to carry passengers on the line until the cause of the trouble was determined. However, your work on this line before causes us to feel confident in acting according to your instructions."

After the departure of Mr. Graham, Riel turned to his assistant;

"Well, Jim, what is your idea now as to the cause of the torpedo's disappearing?"

"Why, it looks to me as if it is the work of nature more than of man. In the first place, how would you explain the cutting or grounding of the beam? Even Mr. Graham, an official of the line, couldn't offer any explanation of that, other than its being struck by lightning or affected in some other way by the elements. It seems easier to place the job at the door of nature than to connect it with the work of any man. If the wizard did do it, what was his purpose? If it were robbery of some sort, he wouldn't have had time to plunder the ships and also cause them to disappear completely before police planes were on the job. Why, when the first ship was lost, there were two American Atlantic police planes within a hundred miles of the trouble area, and they were on the scene within a half hour of the first signs of trouble from the ship."

"It does seem hard to connect the wizard with this," agreed the detective, "And any man not knowing the ability of the clever fiend would not think of attaching the blame to him. However, I have seen some things that seemed impossible accomplished by this man, and the more we penetrate the case the more positive I am that he is at the bottom of the entire trouble. In the first place, both torpedoes left the beam in the same area, approximately an hour's distance from the American coast. Now, if the wizard were able to take the ships from the beam and wished to do so for some reason, he would naturally choose the point closest to his base. Obviously, if it was for the purpose of robbing the vessels, as was his reason a few years ago, his agent, whom he would send to do the robbing, would have a minimum of distance to cover in returning to his base after the deed. Then again, if it is possible that he used the ships as targets to try our new ray or other instrument from his base, he would probably make his tests over as short a distance as he could. At present we have no way of telling how he managed to get the lines out of the beam or how he made away with them so quickly. As soon as we receive the shipping lists of the two ships and the Empire Electro-Chemical Company's loss in the plundering and burning of their warehouse, we will know what direction to work in. My idea that the wizard is at the bottom of the entire trouble will then be either strengthened beyond a doubt or it will be shattered, and we shall have to start from the beginning again. But it is time for lunch, so we will let things rest for the time being. I think we have done a good morning's work already."

They had scarcely finished their meal and returned to the drawing room before Dr. Forrest was ushered into their presence.

"Why the unexpected visit?" the detective asked. "Do you realize the tremendous risk involved in calling on me openly like this?"

"Yes, Riel, I realize it all right, but I was careful to watch out for his ray while on the way over, and I am sure that I was not seen. Anyhow, it doesn't matter so much, as I have completed the work that I was doing."

"What! You mean that you've been able to trace the ray to its base?"

"Better than that. I have perfected a vision projection apparatus by which we can see within his laboratory."

"Good work," commented Riel, "You have indeed done a good piece of work if that is the case, Forrest. But allow me to introduce my assistant, Jim Rogers, Dr. Forrest."

"Now suppose you tell us more about this discovery," Riel continued, as soon as the introductions were over.

"Why, this little box that I have here, tucked under my arm, is all there is to it. It is hardly more than a chemical ray detector, the device that I worked out for you a few weeks ago."

Placing the box, which resembled a simple wireless entertainment and motion picture receiver, on the table, the chemist continued:

"This device enables you to make use of the wizard's own ray to see into his own laboratory and watch his actions plainly. I was——"

The visophone buzzed, and the detective held up a warning finger.

"Jim," he addressed his assistant, "Answer that, and if you hear any unusual sounds of interference, cut off all the instruments immediately."

Stepping to the desk, Rogers switched the reflector plate into circuit.

"Mr. Riel?" a voice asked from the announcer.

"This is his assistant. You may communicate with him through me."

"I have a message for him. Do you desire me to read it, or send it by means of the television recorder?"

"Use the recorder, if you please, as it will be more convenient for me to hand the report to him."

Switching his own automatic reception unit into circuit, Jim saw the other party in the reflector plate, slip a typewritten sheet of paper into his transmission instrument and switch the device on. A moment later Jim took a duplicate copy of the message from his own receiver and handed it to Riel.

The message read as follows:

THE EMPIRE ELECTRO-CHEMICAL CO.,
43-45 Rod Street,
Bristol, England.

Mr. Riel, April 19 1986.
66 x zone 92. *By Visophone.*

In response to your request about the nature of the material taken from our warehouse No. 3. at the time that it was burned, we wish to state that we have found the majority of it to be electrical equipment.

Three complete sets of the new Stinton Multi-ray vision beam projector were among the articles taken; also a number of complicated control panels that were manufactured by us for the Universal News Society, for use with their new beam despatch transmitting device, which, when completed, will be able to transmit and receive a number of different messages both ways simultaneously on one beam. Owing to the loss of this equipment, which was designed especially for this use, the Universal News Society has been forced to postpone the opening of the new multi-message beam until other control panels are made to replace the ones that were stolen.

In addition to the articles mentioned above, a number of containers filled with different chemicals and chemical compounds were missing, when a checking of the partly burned warehouse was made. Also, a safe containing the majority of our papers referring to secret formulae and preparations could not be found after the fire.

Trusting that this report will assist you in speedily clearing up the case and in bringing the guilty parties to justice,

I remain,
Sincerely,
Arthur Curtis, (*vice-president.*)

As Riel was reading the report Jim returned to where the others were standing at the table, with a second report.

"This is a report of the materials carried by the lost torpedos, during their fatal trips," he informed the detective as he handed him the second paper.

"Ah! that is the most important one. It is the one that will tell us whether we are on the right trail or not in the Torpedo Air Express case. Concerning the Empire Electro-Chemical Co.'s robbery however, there is no longer any doubt that it was plundered and set on fire by the wizard. But how he accomplished it, I don't know."

How It Happened

SILENTLY he read the other report and turned with a slight trace of a victorious smile to his two companions.

"Gentlemen, we are on the right track. There is now not the slightest doubt but that the two jobs were committed by the same man, the devilish fiend who tried to rule the world a few years ago. To explain myself, I will tell you what some of the articles were that the two torpedoes were carrying as part of their freight consignment. The 63A, which is the ship that disappeared a month ago, was carrying a large shipment of chemicals and chemical supplies from New York to a chemical supply company in Swindon, England. The 47A, which disappeared last night, had on board a shipment of costly electrical equipment, most of it designed and built for the control of high frequency high voltage electricity, which was on its way to the Experimental Laboratories Limited, London."

"Then it seems clear," commented Jim, "that the wizard's motive was robbery, and that he was after all this chemical and electrical stuff."

"Exactly. The old man's headquarters is undoubtedly a mass of such material, with electrical devices of all kinds, and every type of chemical and piece of chemical apparatus. Now when he designs a new piece of apparatus and needs material to construct it with, he just looks around, using that super vision ray of his, which he is sure cannot be detected, until he finds the material that he needs, and then brings his clever brain and super devices into play to get the desired things for himself. The torpedos were taken from the beam by him in some manner, the coveted cargoes taken and the ships together with the passengers and crews sent to the bottom of the ocean. Present developments lead me to believe that he is not yet ready to step out into the open and defy the world. He undoubtedly robbed the warehouse and the torpedoes to get material for an instrument not yet finished, and he burned the warehouse and caused the ships to disappear in order to remove all traces of his acts. The general belief concerning the loss of the air vessels is that some accident happened to them or the beam, and there is not the slightest rumor abroad that the ships might have been brought down intentionally by some one, or that their crews and passengers could possibly have been murdered in cold blood.

"There can be no doubt now but that he already has some powerful instruments on hand, and our first task is to try and learn the number and nature of his new devices. We must do this before we can hope to get anywhere. We know that he has a new vision ray, and we also know that he has a telepathy ray at his hands again, for an investigation into the robbery of the warehouse points strongly to the use of it. And although the raid took place in the midst of a thickly populated area, no one was found who seemed to really know anything about what happened until the fire was seen. In fact, most of the families in the neighborhood were not even aware that the building was on fire until after the fire apparatus had arrived. It is this that causes me to think he used the telepathy ray to stupefy the thoughts of the residents of the neighborhood, who being home at that time of the evening, which was about ten o'clock, would be sitting in their houses with their heads totally unprotected. The only real clue that we have been able to get of the robbery, is the reports of a few people who claim that they saw a glowing orange mass in the air above the warehouse just before the fire started, and one man claims that he saw a shaft of amber colored light shoot down from the glowing mass in the sky to the roof of the warehouse. Whether this man really saw what he describes, or whether he was a

victim of a dream, is hard to say positively.

"Doubtless old Jolsen has more than the vision ray and telepathy beam behind him, he has a more powerful instrument of some kind. This strange instrument he doubtless used in the capture of the torpedoes, and the mysterious visit to the warehouse in which he managed to remove a large quantity of material including a complete burglar and fire proof safe, which alone would be of great weight. As to the telepathy ray, he could do great harm with that, for it is now of sufficient deadliness to enable him to master the world with it. I have gone to great trouble during the last four years to make the world wear hats and caps of metal lining which protect the head from being affected by the telepathy ray. In this I have succeeded quite well, for as you both know, the rigid hat and cap has become stylish. I want to discover just what instruments, besides these two rays, the wizard has at his command."

"That is where my new idea comes in, Riel," suggested Dr. Forrest, "For with it you can look over his laboratory and equipment yourself."

"Just what does this device do, Forrest?"

"It is quite simple. You have all the necessary equipment on your board to construct the entire instrument. I explained to you, before, how my chemical filters the ray that your scientific foe is using, when it passes through the new detector. It allows the magnetic elements of the ray to make themselves known, or in other words frees them, really enabling them to induce a faint potential in the coils of fine wire, causing them to attract the poles of the compass needle. During the past few days I have been experimenting with the faint electrical impulses induced in the coils by the beam, and I soon found that the current contained the same pulsations and the same frequency as that of the light waves carried on the beam. Now by attaching wires from the coils to an amplifier and building up the strength of the pulsations, the current could then be passed through the electro-magnets of the vision ray apparatus or the visophone. I did this the next time that I detected his ray over the city, and I was astonished to see a plain view of the wizard himself on my reflector plate and a great deal of his laboratory in the background."

"We will hook a detector up to the board immediately then," Riel stated. "And you will show us how to connect it. Now, Forrest, as soon as he puts the vision ray on us again, we will perhaps be able to get some valuable information by getting an idea as to the nature of his equipment."

"Well, it will be very little trouble to connect up one of your new chemical detectors, for all that you need to connect is a couple of leads from the coils to the amplifying unit. Also—"

"Quiet," warned Riel, as a low musical note came from the control board. The large reflector screen, mounted on the centre panel, flashed brilliantly for a moment and went blank. Again it lit up, remained illuminated, and suddenly the features of a grey-haired, sharp-eyed individual about fifty years of age filled the scene. A cruel mocking smile played at the corners of his mouth as the hawk eyes roamed around the room, or rested on one of the three men who stood motionless facing the board. The smile broadened as the piercing eyes rested on the form of detective Riel, while a voice thundered from the sound announcer on the upper panel.

CHAPTER III

Jolsen

"WELL, Riel, it indeed gives me pleasure to hear you are preparing to become my opponent again. It is very pleasing, for I know that you will take more interest in the case than anyone else." Here the crafty smile died from the man's face and a cold steely expression came into the cruel eyes. "This is just a warning, Riel, that I will tolerate no interference, and your first move against me will mean your death. I could, with ease, kill you on the spot, but for reasons of my own I am allowing you to live as long as you make no move against me. I have the power to blow your toy city of London off the globe by a move of a finger; so think well before continuing your work against me. In case that you forget this, I am going to leave my mark on the National Building. Let it be a lasting reminder to you that I am master of this planet and all living creatures on it."

With that the voice ceased and the reflector plate was once more dark.

"Was that the wizard, old Jolsen?" asked Jim.

"Yes, that was he. Although I have never seen the man before, I easily recognized him from descriptions given to me by a friend of mine who was held prisoner by the wizard during his last mad flourish of power. Jim, all you have to do, to win world-wide fame, is to get that man. That's the job that we've got to do. This is going to be a battle of science, and we must use every possible scientific weapon we have to match him. Even then the odds will be greatly against us, and we will have to make up in wits and tricks, what we lack in scientific equipment."

"What do you suppose he meant by his threat against the National Building?" asked Dr. Forrest.

"That is hard to say, for we don't know what power he has behind him. Anyway I will call headquarters and advise them to remove all persons from the building. I do not care to take a single chance while dealing with that man, for he is as cold-blooded and cruel as he is clever."

Dropping into his chair at the desk, the detective threw the transmitting and receiving units of the Triple Wave receiver into circuit

"Headquarters?" he spoke into the instrument, "Is that you, Wilson? This is Riel. Say, I just got a threat against the National Building and—what?" The detective's face paled a trifle as he listened intently to the other party. Then slowly shutting off the instrument rose to his feet.

"The National Building has just crumbled," his strained voice broke the silence of the room, "The eighty story mass of steel has crumbled in a heap, burying and crushing hundreds of innocent citizens beneath it. The wizard has kept his word and has struck. It is a challenge to the world," the sleuth's eyes narrowed a trifle and his fists clenched tight. "A challenge," he continued, with flashing eyes, "that I will accept and answer by dedicating my entire life and money to the task of bringing him to justice."

"And I am with you, Riel," volunteered Dr. Forrest with enthusiasm, "My entire laboratory and staff as well as my time are at your service until this mad maniac is run down."

"And count me in," added Jim. "If he thinks he is scaring us into quitting the case, the devil is wrong. We're just starting, and when we do quit there won't be any more case."

"This is mighty good of you fellows," commented Riel. "We must co-operate and use our combined wits for the sole purpose of breaking him down before he turns loose on the world and creates havoc. You can both easily see now, how the fate of the world rests on our success. We must kill this man at the very first opportunity. To spare his life in an attempt to capture him alive, only increases his chances to turn our civilization into a devilish nightmare, or turn nations into hordes of madmen as he probably would do. We know not what power he has behind him, but the man would not dare defy the entire earth unless well prepared. He has demolished one of the greatest steel structures in London, and undoubtedly did it by the touch of a button in his laboratory on the American coast. As the wizard himself said, he has left us a grim reminder. Let us not forget it in a hurry."

"Are you sure that he is situated on the west coast of the Atlantic?" asked the chemist.

"Quite certain. The position that the coils of the ray detectors must take to obtain maximum strength of energy from the ray, indicates that his ray passes through the detector in an east and west direction. Then another reason for believing that the source of his beam is on the west coast is that the torpedos were taken from the beam in that neighborhood. But the most important thing to do now is to wire up your new vision screen device. We must get as much information about his laboratory as we can."

Rapidly the three men worked at the task of hooking up one of the ray detectors to the amplifying unit of the visophone system.

"Now, Jim," Riel directed his assistant, "send a blind message to headquarters on the Triple Wave set. That will attract his attention and possibly cause him to use the vision ray."

Carefully adjusting the controls of the visophone apparatus, and cutting down the current of the Cobert tubes in the projector cabinet, the men waited with eyes glued to the quivering needle as Jim commenced the call on the transmitter. Suddenly the delicately-balanced compass needle swung around from its north and south position to one pointing east and west. Quickly slipping a sound unit over his ears, Riel turned the detecting and amplifying controls until the loudest sound could be heard in the ear units. Then swiftly slipping off the head set he commenced to carefully turn the controls of the radio vision cabinet and also shorten the gap between the electro-magnets of the projecting unit with another control. A flash across the large reflector plate on the panel board was the result of his careful adjustment of the apparatus, and all eyes were turned toward the reflector plate in high hopes.

Again and again the plate lit up only to die down. The detective battled with the controls for the correct adjustment combination, until the plate remained faintly illuminated. The amplification control now drew all the attention of the man, and under his skillful fingers the reflected light on the screen began to grow brighter.

Soon the hazy outline of the wizard's head could be seen. Clearer and clearer the scene became, until the three men were looking upon the scientist seated at a control studded table, his eyes fixed upon the wall opposite him. Along this wall a work bench could be seen running almost the full length of the room, and mounted above this bench, on the wall, was a white strip, thickly spotted with dark objects.

"That white strip is a row of marble control panels," Riel informed his companions as he gazed at the scene "And the dark spots on them are the electrical controls. It is apparently the same outfit as he had before; with the exception that he has probably made many additions to it."

At the one end of the bench, close to the end wall of the large spacious room, could be distinguished a massive switch board reaching nearly to the ceiling. The table at which the old man sat was thickly studded with dials, buttons and other controls that were imbedded in the surface and flush with the top of the table.

"Keep him attracted, Jim," Riel's curt voice broke the silence again, "Forrest, you adjust the telescopic sight on that square white patch on the wall above the row of marble control panels, that the wizard seems to be looking at. If I am not mistaken, I thought I saw something move in that spot, and if we enlarge the section we will be able to make it out plainly. While you are adjusting the telescopic sight, I will get the auxiliary beam projector trained on the motion picture screen on ou wall here, and also get the scene selector working."

A Strange Scene

SWIFTLY the two men worked, and their trained fingers soon had the extra apparatus functioning. Carefully, Dr. Forrest adjusted the telescopic sight until it took in the complete white patch, while Riel quickly made the necessary adjustments to the auxiliary scene projector and trained it on the wall of the room near the switchboard. He turned on the amplifying cabinet and carefully adjusted the brightness of the Colbert tubes, allowing but a weak light to pass between the poles of the electro-magnets to start with. In another moment a flood of light illuminated the large screen, and in a few more seconds, Riel had increased the current through the vision tubes and the men were looking at a brightly-illuminated screen.

"All right, throw in the primary switch," the detective directed, as he saw the screen brighten up sufficiently.

With a snap of a switch Forrest threw the circuit into place and the next moment the three men were looking spellbound at the wall.

A scene of a strange growth of thick tangled jungle bush showed plainly on the screen, and from among the low branches of these strange dwarfed trees, a creature that resembled a fox slipped into view. Pausing a moment in the centre of the scene, the creature rose up on its hind feet, and turning its head, carefully scanned the surrounding bushes, listening with its ears erect and sniffing the air as if attempting to detect the scent of a foe. Apparently satisfied that there was no lurking enemy at close range, the animal turned its head around and looking toward the bush from which it had emerged but a moment ago, gestured with one of its front paws. A gasp of surprise was the only sound that could be heard in the room as the men gazed fascinated at the scene before them. Again the creature gestured with its fore paw and the next moment two companions came from the thick undergrowth and joined it, as the leader dropped to its four feet again.

"Great heavens, Riel," the voice of Forrest broke the silence. "There are no animals on earth like that. Why man, they're as intelligent as we are. Look at their feet, instead of long claws they have thin nimble fingers which I'll bet are handier than our own."

"Look," Riel's words drew all attention to the screen again. "The three of them are gathered together in a

circle, nose to nose, and are apparently communicating with one another. Whether they are really uttering words or sounds is impossible to say; however, I notice that their mouths are not moving so it is possible that they communicate with one another by a sort of telepathy.

Suddenly the three creatures dropped flat to the ground as a movement of the underbrush attracted their attention. In the next moment they sprang up as one and with long springy jumps disappeared into the growth in the direction of the disturbance. Suddenly the scene disappeared and only the light of the Colbert tubes illuminated the wall.

"He just turned off his vision ray," commented Forrest. "Which means that we see no more of him or his mysterious scenes for the time being."

"What is your idea of the scenes that we saw just now?" asked Riel.

"If it is an earthly scene, which I cannot help doubting, then it must have been taken in the most unexplored spot on earth, for never have I seen or heard of such creatures as those. I have travelled around this old world considerably and never saw anything to equal that. Why, the leaves on those short stunted trees are alone a wonder. Did you notice that they were an almost exact duplicate of our umbrella? I noticed that a group of little veins ran from all corners of the leaf to meet at the stem which is attached to the leaf at right angles to it. As for the creatures, why man, did you see the first one deliberately get up on its hind haunches and look around like a man, and then wave to the others that it was all right for them to come out?"

"You no doubt have the same idea that I have, Forrest. It looks as if our clever wizard has an interplanetary vision set among his collection of super instruments and that he was getting this scene from another planet."

"It is hard to realize, but that is the only explanation that I can offer. These creatures were undoubtedly far more intelligent than any that we have on earth. They seemed possessed with a reasoning mind, that may not be developed as much as ours, or for all we know, may be more highly developed."

"Impossible, Riel. They seem unusually intelligent, but the possibility of their being superior to us is absurd."

"Not at all. The evolution of man on this earth resulted in gradual changes to the body as well as the mind. It is possible that these creatures may have developed intelligence through the countless centuries past with peculiar physical changes.

"A human beast I suppose?"

"Yes, something like that."

"Well I can't see things in that light, Riel. Anyway, we are both too ignorant of the facts to do much discussing on the subject."

"Yes, and we are wasting valuable time. It is hard to say whether we will have another opportunity to see such things as we saw just now, for it just happened that he was using his interplanetary vision device when he switched on the vision ray to watch the message that Jim just sent to the downtown office. However, we have made good progress towards our goal, for the discovery of this instrument of his adds to the information that we have gathered to-day concerning his equipment. To sum up, the devices that we know he has would alone make a powerful armament for any nation. He has the most powerful television ray in the world, also an interplanetary vision system. He is in some way, able to break in on the visophone system whenever he chooses as well as overhear and see all connections made on the system without a connection through the exchange offices. He can in some manner destroy buildings as tho they were toys, and remove huge modern air liners from their route beams causing them to completely disappear. He can see almost everything that is going on in the world and can tap practically any line of communication that he wishes.

"That is the known ability of the wizard. What else he can do is hard to tell, but I have a feeling that he has some instrument that is as powerful and as deadly as all of these combined. That is the next thing for us to find out—just what his most deadly instrument is. We must find out how he was able to commit these warehouse robberies."

A Trap

"IS there no way that we can get him to demonstrate his methods?" asked Jim.

"I was just thinking of that, and I think we can work it out. Say, Forrest, you've done a great deal of experimenting on some new idea for a motion picture transmitter, haven't you?"

"Yes, and I have my idea in working order. I have perfected a device that will transmit eight different motion pictures on one wave, and any person with a proper receiving *visoset,* can, by a slight adjustment of the controls, pick his own entertainment of comedy, drama, adventure or whatever the customer wishes to see. It'll revolutionize the motion picture industry."

"You told me a few minutes ago, Forrest, that your equipment was at my service. Now I want to ask you to allow me to give one of your new picture machines to the wizard."

"What do you mean? Hasn't he got enough stuff already?"

"Listen. Your new device has given me an idea, and I want to use this idea to tempt him to make a raid as he did before, in hopes that I may be able to learn how he does it."

"Well, if my new device will assist you at all, you are welcome to use it as you wish. I have all rights to it protected anyway, so it will not affect me if the nature of the outfit becomes known."

"That's great, Forrest. If I ever draw the net around this man, it will be due largely to your work. Now here is the plan. On a certain night, I will call headquarters, using my Triple Wave system of communication; and upon making sure that old Jolsen is listening in or rather looking in on my messages, I will ask them to place a strong guard around a certain building where you are making secret tests with an interplanetary vision set, to prevent any attempt from being made to steal the device. I will give them, for the wizard's benefit, the location of the place, where we will have you and your device installed, along with a sprinkling of experimental equipment to make the scene natural. Then I will shut off the Triple Wave instrument and watch the ray detector to determine if he will keep the ray on, as he will probably do in order to find the location of your interplanetary set and see what it is like. I will also watch his actions by tapping his vision beam with this auxiliary vision projector set, and try to uncover more information as to the equipment that he has in his laboratory. He will probably have the ray on you quite a while and study

your apparatus closely. This will give me a good opportunity to get an enlarged view of different parts of his laboratory and enable me to study the construction of his controls and devices at close range by using the telescopic sight scene selector and the auxiliary vision beam projector.

"But that is not the main reason for this trick. When the wizard puts his vision ray on you, he will see you projecting scenes of some other planet on a large screen. He will see great structures, super intelligent beings of queer shape, new weapons, rays and other such things. He will see and perhaps hear, if his vision ray can also detect sound waves as his old one could, the reception of queer sounds from your super set. He will see you decipher the signals received, and then see you leap around the room with joy as if you had received messages revealing to you some great secrets and valuable information from the other planet. All this will give you an excellent chance to show your ability as an actor, Forrest, for you must act well to deceive a brain like that of the wizard. The old man, believing that you are the possessor of a powerful device, will plan at once to get it, for two reasons: first, to add it to his own array of mighty instruments, and second, to prevent you or anyone else from learning any knowledge that may be used to advantage against him. When he raids the place I will be on the job to see how he does it, and I will find out the use to which he employs one or more of his many pieces of equipment."

"Yes, but where do we get the interplanetary scenes?" Jim asked.

"That's up to Dr. Forrest. He will have to make a stretch of pictures using all the tricks known to the motion picture industry to produce a series of astounding scenes that might be viewed on another planet."

CHAPTER IV

Setting the Trap

FOUR inactive days had passed since the first interesting day on the case. Riel seated comfortably in a chair near the bookcase, with a cigar hanging idly from his mouth, looked at his watch:

"It is four o'clock, Jim. You had better get to the desk and put the first call through to headquarters. I'll watch the wizard's actions by means of the ray detector."

Jim immediately stepped to the desk. After four days of idleness, the detective's words were like music to his ears. The time had come at last. The first tilt between the world's most famous detective and its cleverest and most dangerous criminal was at hand, with the sleuth taking the offensive. With a light heart Jim slipped into the chair at the desk, and looking up at the meters on the board in front of him, commenced fingering the controls on the desk. Large electro-magnetic contactors flashed in and out on the crowded panels, and relays made and broke different control circuits under the guidance of the fingers poised over the control buttons at the desk.

"All ready, sir?" Jim asked.

"Let them have it, the time is up."

A few more circuit contactors snapped into place on the board, as Jim pressed two more buttons. Then lifting the desk speaking unit to his mouth, he spoke into the instrument:

"James Rogers, assistant of Inspector Riel, speaking. Mr. Riel desires a guard to be placed about the building at 187 Elm Street for the purpose of protecting a scientist, Dr. Forrest, who is going to demonstrate a device to-morrow afternoon that receives vision scenes from another planet, and who fears that when the true value and possibilities of the apparatus become known, attempts will be made to steal it. Mr. Riel personally wishes that every possible means of protecting the device be utilized, as he expects to make important use of the device in the next few days himself, and states that to allow it to fall into certain hands might prove disastrous to the entire world."

"Do you suppose the wizard will tumble for this message?" Jim asked, after he had finished the message.

"I am sure that he will. He now has his ray on headquarters ready to read it.

"What's our next move?" was Jim's eager question.

"Get the wizard's laboratory on the reflector plate that is mounted on the switch board, and we will see first what he is doing. Then we will get a view of Dr. Forrest's place by means of the private visophone wires that I have got connected up between us for this purpose."

It took but a moment for Jim to get a scene of the wizard's place on the visophone, and for a few seconds both men watched the reflector carefully. Old Jolsen was in his seat at the table manipulating a number of push and dial controls.

"Get the telescopic sight adjusted onto this entire scene, Jim, and run it through the auxiliary onto the large wall screen. We can study his actions with ease then."

The scene of the grey-haired man at the control studded table, with a mass of controls, wiring and scientific equipment for a background, formed an interesting picture indeed, and the two observers left the desk and the control board to approach closer to the fascinating scene. Suddenly the large, square vision screen on the wall of the old scientist's laboratory lit up, and showed a scene of a man turning and adjusting the controls of a complicated electrical instrument.

"Quick Jim," snapped Riel. "Pick out that screen of his with the telescopic sight. It's Dr. Forrest at his device."

Springing to the board, Jim loosened the sighting instrument, adjusted it on the one portion of the laboratory scene that showed the large vision screen, and tightened it into place. The results were amazing. On the large life-size screen in the detective's room, was now a view of Dr. Forrest working on his device. The scene took in only part of the room showing the instruments and their many adjusting controls, and the doctor at the controls carefully turning the dials.

"That device is in reality Dr. Forrest's new eight picture radio-vision invention, that he was telling us of," Riel commented, as they watched the scene before them. "It certainly does look as if it might be a super interplanetary vision set of some nature. The wizard has his vision ray on the doctor now, and instead of being satisfied with a small view in the reflector plate on his table, is amplifying the scene and projecting it onto the large wall screen. He is doing exactly as we are, only that we are making him get the original scene, and are stealing a copy from him."

"Well, that is good," chuckled Jim. "Making him show you how he walks into your trap. You surely deserve some credit, Mr. Riel, to outwit the clever wizard with his own favorite weapon, which is scientific knowledge. But look, old Jolsen's adjusting the scene on his screen. You see, we even have him adjusting

our vision scenes for us, for we see the same views that he puts on his large screen."

Jim was right. The scene before their eyes was changing and drawing away, continuing this movement until the whole room was in view. But now another thing of interest was seen. On the wall opposite to the machine and its operator, was a screen with an active scene being projected onto it by the apparatus. Again the scene shifted, this time drawing up closer with the doctor's screen being kept in the centre of the view.

"Old Jolsen's getting a close adjustment on the screen," Riel commented. "Now is the most critical moment of all. The success of this trick will depend upon how well Dr. Forrest has made those pictures. A slight flaw will enable the wizard to see through the whole thing."

The Strange Scene

WITH nerves tingling under the strain they watched the scene draw closer, and gradually their faces took on a look of amazement as the scene became plain to their view. A cluster of mighty towering buildings filled the lower portion of the picture, and aircraft of freakish and undreamed of shapes and sizes flew among the great buildings. Short five-foot pedestrians with claw-like fingers, short arms but extra long and clumsy looking legs, floated up or down from the windows of the buildings with ease. Vivid beams and rays cut the air in all directions, flashing brilliantly against the dark overcast sky. On the streets far below, moving conveyor belts carried both pedestrians and their curious vehicles along between the buildings.

"Heavens!" Jim gasped. "What a picture! Man, that's a future city to the inch."

Again the scene shifted, but this time it was just the scene itself, the view of the doctor's screen remaining stationary. Dr. Forrest was responsible for the change this time, and they were soon looking down onto the city from a greater distance above it. A cloud appeared to dim the view for an instant, but it soon cleared again.

Repeatedly the view of the city was hidden by the disturbance below, that cast a veil between the city and the observer, until only an occasional glimpse of the mighty metropolis could be obtained.

Once more the scene shifted and they were again looking at the city from their former position. But what a difference now! Blinding clouds of sand were being hurled through the air by a tremendous wind. The atmosphere was full of whirling sand and tearing wind. The sky overhead was as dark as night, and the city was flooded with lights of every possible color and description. Aircraft were rapidly dropping behind the sheltering buildings, while the rotary streets below were now almost deserted before the onslaughts of fierce blinding clouds of sand. A pedestrian, while gliding from one floor of a building to another, was caught in a fierce gust of wind and hurled upward into the black inferno like a toy balloon.

Suddenly, without warning, the scene went blank, and Riel turned to his companion.

"Jim, I'd almost believe a scene like that to be a view of another planet, myself. It was better than I had hoped, and I am certain that old Jolsen will fall for it. Forrest has undoubtedly come to the end of his picture strip. It looks as tho the wizard is changing the scene for us again, so we'll wait and see what he does next."

Again the chemist and his apparatus became the centre of interest as the wizard changed the scene on his large screen, automatically changing the detective's also.

"Look," Jim spoke, pointing to the scene before them. "He's getting a close up view of the apparatus. Isn't there any danger of his recognizing it as a motion picture transmitting device?"

"I doubt it. I cautioned Dr. Forrest to add a lot of extra wiring and other equipment to his device, for the purpose of preventing the old man from being able to study it out in a hurry. Do you see that centre panel of the main switch-board?" Riel pointed to the switch-board with which the chemist was controlling the large cabinet that was situated in front of it on a special table. "That panel has probably twice as many controls on it as it needs, the extra ones being put on to give the apparatus the strange appearance. Also the cabinet, which likely makes use of a great amount of fine wires, coils and other numerous parts, will probably contain many other wires and false parts to puzzle the wizard in case he should attempt to try and trace the operation of the system, or take a vision ray photo of it. But the old man has now got the device to a close up view, he is evidently still greatly interested in it, and is attempting to get an idea as to the way it operates. This is a point in our favor, for it appears as if he believes the scenes were from another planet."

For another ten minutes, the set remained in the scene, while Dr. Forrest continued his operations and adjustments of the many controls, in an evident effort to get the device functioning again. Then again the scene suddenly went blank. Going to the switch-board, Riel gazed at the scene in the reflector plate on the panel in time to see the old scientist press a control button on the table. The next instant the scene on the reflector plate before his eyes disappeared.

"Well, that's that," Riel smiled at his assistant. "That's the curtain on the first act. Now we must work fast and get ready for the second. I am pretty sure that old Jolsen is convinced that the device is an interplanetary vision set."

"Then you expect him to try to-night to get the device, I suppose?"

"I expect him to raid the building, yes, and attempt to get the instrument before its operations are shown publicly to-morrow."

"But suppose by chance, he succeeds in getting the device?"

"I expect he will. At least we will make no attempt to stop him, unless we see a chance to get old Jolsen himself, which is not likely, for he will most positively stay in his laboratory, where he is safe behind his powerful instruments. He will probably direct, and assist in the task from his base. However, he will not get the complete device, for Dr. Forrest will have removed some of the most essential parts. Now, I will leave immediately for head-quarters. There are a few preparations that must be made before night in order that our plans work out correctly. You will remain here and keep a close watch on the board, and note every time the ray detector is disturbed."

Doubts

THE detective took a final look at the ray detector, and left the room. A few moments later, his small swift plane was speeding across the short

runway and climbing rapidly up to the first traffic lane.

It was six-thirty, and dusk was settling on the land, as a light-constructed plane slipped to the ground on the landing area in front of the detective's home, and stopped just long enough to discharge a passenger. It glided off into the air again. A few moments later, Dr. Forrest was ushered into the drawing room.

"All alone?" he greeted Jim, noticing the absence of Riel.

"Yes, Mr. Riel is downtown putting the finishing touches to the preparations for to-night's work."

"Riel certainly lays his traps well, but that is one reason why he ranks at the top of the list among the inspectors at Scotland Yard. But tell me, Jim, just how he intends to watch the movements of the wizard from here."

"I don't know myself. There are two ways that I know he might use."

"What are they?"

"Well, first, it is possible that the wizard will remain at his base and watch his raiding ship by means of the vision ray. If so, then all we have to do is trap his beam as we did before and get the view of his airship off his screen. Of course we can't depend upon this plan because if he was to just use the table reflector and not throw the scene into the large wall screen, then we would not be able to see anything outside of his laboratory. As you no doubt know the face of his small table reflector plate is turned away from us. But if he should throw the scene onto his large screen which can be seen by us in the scene of his laboratory, then we can watch the progress of his air raider as well as he himself. But, as I said, we cannot imagine Mr. Riel relying upon a way which is so unreliable. The second way is to use our own vision ray which has a range of about forty miles and a penetrating power at a distance of five miles. The drawback to this however is that the ray is likely to be detected by the old man who will no doubt be on his guard against such things. Also the penetrating power of the ray is unreliable at a distance of over five miles, and as the warehouse that you have your device in is at least eight miles away, we will not be able to watch the interior scenes of the warehouse, or penetrate through the walls of the wizard's ship and get a glimpse of his equipment."

"Well Jim, you can leave that to Riel, he'll find a way. My only fear is that our clever crook will see through the affair and not show up."

"Don't worry about that, doctor, those scenes that you put on to-day were clever enough to fool anybody. Besides, your device looked curious and complicated enough to arouse the interest of any scientist. If he fails to show up it wont be because he saw through your work; for after you finished projecting the scenes, he got a close view of your apparatus and apparently studied it carefully for a few minutes."

"Look," Dr. Forrest pointed to the panel ray detector "The pointer is in the vertical position. The wizard's vision ray is on the city."

Jim made a quick note of the time, and turned to his companion:

"Suppose we get a scene of him and see if we can find out whom he is watching, we may learn something that may be a great help to Mr. Riel."

"That's a good suggestion, Jim. Throw a scene of his laboratory on our large screen by means of the auxiliary scene selector. We are taking no chances in watching him, as he is unable to detect us."

It took Jim but a few moments to get a view of old Jolsen's place on the large screen, and both men glanced at the white square on the wall of the wizard's laboratory above the row of white marble control panels, for a sign of a disturbance, but it was blank. Old Jolsen was seated at the table, looking at the small reflector plate before his eyes.

"We'll see very little of him this time," commented Jim. "The old man's reflector plate is turned away from us and he is not using the wall screen. We may as well try to comb our hair in the back of a mirror as to get a glimpse of a scene from that plate."

The old wizard was apparently enjoying the vision before him for his face broadened into an amused smile and he rubbed his hands with satisfaction. Then pressing two buttons at his finger tips, he turned around in his chair, facing the wall behind him.

"By Jove!" Jim cried, noticing the man's actions. "He's watching the large screen. He's switched it on. See, doctor, the shifting shades of light on his screen? I'll set the scene selector in a jiffy and we will see what he is so tickled over."

Both men gasped in astonishment, as Jim threw a close view of the wizard's screen on the wall. The view showed Riel standing before a desk at which another man was seated. Both of them appeared quite angry and were exchanging hot words.

"Holy mackerel, that's Watson, the chief," Jim exclaimed, referring to the man seated at the desk. "And by the looks of things they're having an awful row."

"Yes, Riel has bumped up against something or other. It looks as if things are going wrong with him, which will probably mean that events are not going to turn out as he planned them to-night."

"Damn it." Jim gritted his teeth. "It would be just like the chief to spoil his plans by some foolhardly objection. It is likely that he wants a full explanation of what we have accomplished so far and what we intend to do next, and Mr. Riel is trying to keep some of his information from the chief, knowing the ability of the wizard to pick news out of other men. I don't wonder at Mr. Riel getting sore, not being permitted to work the case as he sees fit."

"It looks bad all right. Riel would never display his temper like that without a reason," commented Forrest. "Especially to a superior officer. Jim, I wouldn't be surprised to see Riel's plans go flunk to-night."

"I've got it," Jim fairly shouted in joy as he leaped up to the screen and examined the two men closely. "Doctor, has Mr. Riel got another ray detector besides the ones in this room?"

"Why yes, he made a few more himself, or had them made. One is in a watch that he carries—"

"Then I'm right, for I noticed him look at his watch just now. This argument of theirs is all molasses."

"What do you mean?"

"Why, he is watching the wizard's ray by means of the watch indicator, and is putting up this argument with the chief for the benefit of old Jolsen, who he knows is watching him."

"By Jove you're right, lad. I might have known Riel would never have been caught napping like that."

"And just look at the wizard," smiled Jim, pointing to the panel reflector plate that showed the old man and a great deal of his room. "Look at him smile as he watches then arguing. Gee, doctor,this is great: outwitting the wizard so neat and making him like it."

"Riel is certainly a great actor, Jim. Look," Forrest pointed to the wall screen. Riel was pacing the floor as his superior kept up a flow of words from his wrath-

ful face, and pausing in his steps at intervals shot back a heated reply. With eyes blazing Watson leaped up from his seat, and his fist came down on the desk with a fierce thrust.

"It is sure too bad that we can't hear any sound." Jim complained without taking his eyes from the scene before him.

Riel had paused in his walk now, and savagely grabbing up his hat from a corner of the desk, turned on his heel and quickly left the office while Watson, stepping from behind his desk, commenced pacing the room.

The sudden disappearance of the wall scene drew both men to the reflector plate on the control panel. Old Jolsen was back in his chair at the table watching the small reflector plate again.

"He's probably trailing Riel," suggested Forrest. "And he had to be at the table to control the movements of the beam and his scene reflector apparatus so as to keep the detective before his eyes all the time. We may as well shut our set off, as there'll be little to see now."

"I wish we could see more of his laboratory, remarked Jim as he shut the set down. "The part where he has likely got the most of his equipment, is what we are unable to see."

"Well there is no way that we can help that. Anyway, Riel will likely be here soon now, and we'd better do very little more until he arrives."

CHAPTER V

More Plans

THEY had not long to wait. Not twenty minutes had passed before the hum of the detective's high speed plane sounded outside, and the next moment he was in the room advancing toward them.

"Glad to see that you are already here, Forrest," he greeted the chemist. "Did you see any signs of the ray on your way here?"

"No, I watched closely for it but didn't see a single trace of the beam. I am sure that I arrived unseen."

"Well, that's good; it is of the greatest importance that we make not the slightest suspicious move, for the shrewd wizard is not an easy man to hoodwink. Jim," he continued, turning to Rogers, "was the ray on the city during the last hour?"

"Yes, we detected it about an hour ago, I have the time noted down, and it was on until about five minutes ago."

"Good; then we are probably all right. I purposely attempted to attract the old man's attention during the time, because—"

"Yes, we know," cut in Forrest, "You sure gave the old man a merry hour with your acting."

"How did you fellows learn this?" asked Riel.

"We tapped his beam, and the scene that the wizard was looking at was so good that he threw it onto the large wall screen to get a better view of it, and we threw the same onto our large screen. Well, if you were acting, you surely deceived the wizard, for he was tickled to death to see you arguing."

"That's certainly good news, fellows. It happened that I was at headquarters when he threw the ray on, and suspecting that he would watch me and perhaps become suspicious of my being around headquarters, and would fear that a trap of some sort was being set for him, I entered the chief's office and slipping him a sign, started the argument. The chief was quick to catch on, for he knows the nature of the man that I am operating against. So we lit into each other, and if I'm to take your word for it, Forrest, we seem to have put the act over pretty well. Of course you two wouldn't be able to hear the conversation, but our argument was over the way I was conducting the case against the wizard. The chief, getting onto the drift, demanded that I show results as it was extremely dangerous to allow the wizard any more time to further prepare himself against the world. I told him that I had accomplished very little so far, but explained that the loss of the two air torpedos was the work of this man, and perhaps the robbing of the warehouse in Bristol. I explained that on investigating the case I found evidence that pointed strongly to his use of the telepathy ray. Then the chief wanted to know where the wizard was located at, and I replied that as he was not yet using any vision ray by which we could trace him. I had only one way to tell where he might be and that is by the robbing of the torpedos that took place near the west coast of the Atlantic. I stated that his headquarters was probably near that end of the air beam. I told Watson that I would bring in results in time, but that I was going to handle the case in my own way, and if he put other men on I was through.

"The result of our little made-up dialogue, will be assurance to the wizard that he has little to fear. I hope to also encourage him to raid the warehouse to-night taking advantage of the break between the chief and me. Now, Jim, you keep constant watch on the indicator, and as soon as he shows himself, get his laboratory on our large screen."

"But how do you plan to watch him when he strikes?" asked Forrest.

"The only safe way is by television. I already have my control board here, connected to an empty garage two blocks away by underground wiring, and this garage is connected by overhead wiring to a building near the warehouse downtown. From this building I have underground wires running to two television instruments, one installed inside of a heavy iron box and placed inside of the warehouse so as to receive a view of the section of the building around your coveted piece of apparatus, while the other is located in a building next door and adjusted to cover the sky above the warehouse, allowing us to get a sight of the aircraft that the wizard will likely use in his work, and which alone, I am sure, will be a sight worth seeing. The electrical pulsations of these two instruments are received at this control board here, and we will run them through the apparatus as we do the visophone circuits. We will project one onto the reflector plate mounted on the control panel here, and the other through the regular visophone projection unit and onto the small reflector plate on my desk. We will then adjust the telescopic sight of the scene selector so as to be able to train it on either plate in a moment, and by means of it be able to amplify any part of either scene and throw it onto our large wall screen.

"We can control the two television sets to a certain amount from here by means of our wired system and an arrangement of electro-magnets, enabling us to change the lenses of the two devices, moving them vertically or horizontally, thus allowing us to take in the entire active area and also make it possible to keep the centre of action in view. I had provided for the use of such instruments when I first constructed this switch-board, although wired television was a thing of the past then and used very little. However, I found no need for using a television set from a distance until

now, but it is likely that in this one night's work alone the equipment will more than pay me for the trouble that it caused me to have it installed. The two red buttons on my desk will switch the two circuits onto the board, while the small black and white dial on the board below the reflector plate, controls the vertical adjustment of the two television sets. Now the brown dial there beside the other, is a control unit of the two sets being the one to adjust the horizontal position.

"Now, cut out the visophone completely, Jim. It means severing our means of communication with the rest of the world, but during the next few hours we will be better off if we are free from interference. And remember, Jim, some one must remain on watch at the board constantly until we detect the ray. There is little doubt but that he will use his ray to watch and help his men, and the moment that we see a sign of his beam we will know that he has commenced activity. Also, Jim, throw on the two television sets as soon as you get the board adjusted for them, we must be sure of their working correctly, even to projecting the scenes from the two small plates onto our larger screen. However, do not keep them on any longer than necessary for there may be a possible chance of his detecting the instruments. This possibility is quite small though, because the one set within the warehouse is enclosed within a cast iron case with the exception of an opening for the lens, and it will require a great beam pressure to enable him to see through the iron case. Also, any magnetic field produced by the instrument will be hard to detect, due to the protecting metal acting as a shield and a conductor of the magnetic forces. The second set is removed far enough from the scene of action to be safe from discovery. Still, we must not take the slightest chance in any way, so do not operate the sets any more than enough to make the tests and necessary adjustments."

"But why did you resort to the trouble of a wired system between the television units and your control board here, when a wireless radiating attachment could have been put on the units easier?" asked Forrest.

"There are many reasons," replied the detective. "First, a radio vision system would have radiated its waves into the air which would have been detectable by the wizard easily, if he took the precautions to do a little scouting around before he acted. Even if I used the Triple Wave system to prevent anyone from receiving the complete pulsations of the vision sets, the waves being sent out on three different settings or at three different frequencies, that would have made it easier to be detected by the wizard who would be quick to connect any one of the meaningless sections of the vision beams with me. A wired system however, does not set up such a disturbance in the air, at least not enough to be detected under ordinary circumstances. Another reason is that the magnetic high frequency field with which we have the house here surrounded to block the use of his vision ray within the building, would also prevent us from receiving other vision waves of any nature."

Ready For Business

"BUT you are able to use the visophone."

"Yes, but I have the detection and call selectors mounted outside of the magnetic field, and the impulses carried into the house to my board here by underground, metal shielded, insulated conductor wires."

"And so you produce the vision here from his ray after it has already passed through your high frequency field?"

"Yes. In other words I can use his beam to watch him while old Jolsen is unable to use the same beam on me because of my field around the house."

"Then your detector here on the board really detects the ray itself?"

"Yes, the magnetic properties of the beam, although altered by the action of the high frequency field that it passes through in reaching the interior of the house, are still present, and are detectable just as well as they are on the outside of the house. However, we would be unable to produce any vision scene from these magnetic impulses received from his beam, when detected within the house, because, as I said before, the modulated nature of the waves is destroyed in passing through the high frequency field that I have around the house."

"It is almost nine o'clock," Jim announced from his seat at the desk where he was keeping a constant watch on the board. "And so far, I haven't seen a quiver of the detector needle."

"Have you tested out the television units yet?" asked Riel.

"I have them ready and have the visophone cut out of circuit, but I haven't tried them out yet."

"Well, we will see that they are all right," the detective said, advancing to the control board and beginning to adjust different controls. "Jim, train the telescopic scene selector on the small desk plate first, and throw its full scene onto the wall screen."

In a few seconds, Riel had a scene showing in the small visophone reflector that sat on his desk, and immediately Jim threw the same scene onto the large wall screen. It was a view of the area above the buildings, but all was still and quiet. Not a sign of any disturbance could be seen.

Slowly the minutes ticked away as the two men waited for a sign of the wizard's activity. Jim divided his time between throwing an occasional view of one of the television scenes onto the large screen in an attempt to find a sign of the raiders, and watching the ray indicators, while Forrest puffed impatiently on a cigar and paced up and down the room. Riel, alone, appeared contented and at ease, seated comfortably in one of the chairs facing the control board. Outside of an occasional glance at the ray indicator on the panels, he seemed to pay little attention to the subject of interest.

"It would be a surprise for us if old Jolsen were to swoop down on the city and take that multi-picture apparatus of mine from the warehouse while we waited here looking for his beam," remarked Forrest, pausing in his stroll before the detective's chair.

"You put those special electro-magnets in the set, that I gave you, didn't you?" was Riel's reply.

"Yes, I did my part just as you directed. I took care to see that they were connected to the supply current correctly before I left the device. If the old man succeds in slipping away with the outfit while we are here discussing the subject, it will not be from any failure on my part, you can depend upon that, Riel."

"Well, it is hard to say how neatly he may be able to remove the device, but so far it is still in the warehouse."

The False Message

"IT'S been an hour since we looked at the interior of the warehouse through the television set that is located inside of the building, and a lot can happen in

that time."

"Jim will take an occasional glance through both television sets, but it is not really necessary to use the instruments to tell us what is going on inside of the building. Those coils, that I had you leave energized in your radio picture machine, are radiating a wave that I am able to detect by means of a small radio device placed inside of the one television instrument that is located in the building near the device. Failure of these coils to radiate their magnetic forces will cause the radio attachment to act and close an alarm circuit, causing a buzzer on my board here to announce the disturbance. It is impossible for the old man to remove the outfit without breaking the connection of the coils, also it is impossible for him to remove the coils without interrupting the circuit, as you yourself will know from the way that I had you install them. So there is little doubt but that he will announce himself when he attempts to remove the apparatus."

"But he will likely detect the magnetic effects around the apparatus before he attempts to remove it."

"I expect he will," Riel replied, "but it will not help him any. It is humanly impossible for him to remove the coils without our knowing it. If he cuts off the power, we will immediately know it, for my buzzer here will announce it."

"Then you are going to depend entirely upon that to announce the presence of the wizard,"

"No, no more than I would depend upon his vision ray alone to tell us of his activity. We cannot depend entirely upon any one of these things but between the three ways of detecting and watching him we should not fail altogether. It is now almost twelve o'clock. It is late enough to enable us to find out whether the old man is going to accompany his men on this raid or stay behind in his laboratory. It is my opinion that he will remain behind and protect his men with the mighty, deadly weapons that he seems to have in his laboratory."

Rising from his chair, the detective walked up to the desk, and Forrest followed.

"Jim," Riel turned to his assistant seated at the desk. "Put the Triple Wave set in action and send headquarters a message under the important signal addressed to Inspector Watson. Say that we now have proof that the Bristol robbery was committed by the international criminal known as Jolsen, and say that there is now no doubt but that he used the same telepathy ray that he used before. Also ask him to get in touch with the American secret service, with the intentions of making preparations to locate the exact spot where the base is, and of preparing to send a large well-armed and protected air fleet against the man. Add that no open move is to be made until further word from me, and sign my name to the message."

"What are you up to now?" asked Forrest, as Jim copied the message on a sheet of paper. "Do you think that you can raid his place with planes like you did before?"

"Why, of course not. Forrest, you are slower than I thought. You know yourself that the wizard can pick up any message that I send on the Triple Wave system, so any word that I send to central office by this means, would naturally be a false or misleading one. To try to raid the base of this man without knowing any more about him than we do as yet, would be just a new way of committing suicide. We have got to know just what instruments, rays and other devices he has to turn against us, before we make the least attempt to crush him or get him riled up in any way. That is the reason for temping him to this raid."

"Then why the message just now?"

"Just to see if he is home. If he is intending to raid to-night, and he himself is going to accompany his men, then he will have left his base before now, for it is located on the other side of the ocean, and no matter how powerful his air vessel may be, it is humanly impossible to cross the ocean in a few minutes. And as the best time for him to work unnoticed on this job is between two and three o'clock, he should be here within an hour now. When Jim sends the message, the crafty wizard will be quick to read it if he is still at his laboratory: first, in the hopes that he may learn something about the device that he is about to take, and second, to determine if I have made up with the chief and am going to continue on the case alone; and then again perhaps to see if there is a possible trap set for him. For the wizard is not one to fall easily into everything."

"The message is inserted in the transmitter and ready to send, sir." Jim announced from the desk.

"Then send it through, Jim, and watch the desk ray detector as you do; we will watch the one on the board. There is little chance of the two failing to work."

Three pairs of eyes gazed at the ray indicators as the relay coils of the secret transmitter hummed and vibrated for a few minutes and then automatically shut off when the message had ben completed. But not a move of a needle could be seen. For five minutes no one spoke but all kept their eyes on the balanced pointers of the ray indicators, but not the quiver of a needle rewarded them for their trouble. Finally Riel, breaking the silence, turned to Rogers:

"Jim, throw on the television unit showing the outer scene of the warehouse, and throw the complete scene onto the wall screen."

"Well, what's your opinion now?" asked Forrest. "Do you suppose that he has seen through our fake interplanetary vision set, or that he fears a plot to trap him?"

"I am more positive now, that he will attempt to get the apparatus tonight in some manner, and that he himself will be with his men to see that he does get it. It is possible that his air machine is as powerful and as well-equipped as his laboratory."

CHAPTER VI

A Study In Clouds

BOTH men turned to the wall as Jim threw the scene on the screen. It was a view of the area around and above the warehouse building. The clear but moonless night showed its millions of starry gems, while the dark shadowy streets and adjoining buildings below were silent and dead. It was truly the time for such a piece of work as had been suggested to the master mind of crime.

"Raise the control a bit," the detective directed Jim who remained at the board. "Sweep the sky from left to right at your highest elevation."

"I'm betting that we're due for a disappointment," Forrest spoke, gazing at the clear starry sky in the scene, "the only moving thing in sight yet is a solitary bit of a cloud."

"Yes," replied the detective quietly, "And doesn't it strike you that that faint bit of cloud is moving with unusual swiftness across the sky?"

"I suppose that's due to a strong wind blowing in the

higher altitudes, for that cloud is high enough to be thus affected."

"Yes, it is high, in fact it is the unusual brightness of it that makes it visible at all. Under ordinary circumstances it would be hard to see that small cloud on a night like this. The amplification of the scene brings it plainer to our view."

"Well, while we are waiting for your visitor to arrive, we may as well while away the time discussing clouds. It is funny what queer things a man can imagine when gazing at clouds for a while, watching them twist and reshape themselves in all ways."

"This particular cloud does seem interesting, Forrest. It appears to be growing a little larger: as if it were approaching and descending too. For a while we are going to study that cloud plenty, for it is really losing altitude and it is not imagination that makes me think so either. Watch that bank of mist closely, Forrest. See! It is approaching fast now, faster than a cloud usually travels, also it is holding its formation perfectly, a smooth oval shape which is unusually firm and solid in appearance."

"It does look peculiar," admitted Forrest as he examined it closer, "And I would almost swear that it is lower than it was, a curious demonstration of the actions of the elements that are tossing it about. It probably got into the path of a downward air current. It leads one to wonder at the many different air currents that are coursing through the atmosphere above, especially in an area like this where the cold ocean air currents meet the warmer ones from inland."

"Jim!" Riel's voice rang out firm and commanding, causing the others to look up with new interest, "Get that cloud on the selector, quick."

In another moment a view of the cloud at close range was obtained, and the detective stepped closer to the screen to study it.

"Good God!" Forrest gasped as he observed the scene, "It's he. It's the wizard air craft inside of that cloud."

The outline of an oval-shaped torpedo vessel could be seen through the thin mist that surrounded it, but although the scene was adjusted to give the closest possible view of the craft, it was impossible to distinguish its features or construction through the banks of mist that clung to it. Just a dark egg-shaped object could be observed within the cloud.

As the men watched, a bright flash shot across the scene momentarily blotting it out. Again and again the trouble occurred and Riel turned to Jim:

"Throw the scene of the other set on, Jim," he instructed the other, stepping up to the control board himself, throwing out the small breaker contacts of the one television set and putting the control switch over to the other side.

"What is it?" asked Forrest, as the detective finished adjusting the controls and turned his attention to the screen again.

Riel merely pointed to the ray indicator on the panels. Its pointer was energized and had swung over to the extreme right hand side of the scale.

"Then our little game is up," commented Forrest, "For he's spotted your television units with his vision beam"

The scene from the other television unit was now on the screen showing the interior of the building. For a few moments Riel watched it in silence then turned to his companion.

"You'll notice, Forrest, that there is no disturbance on this scene, no flashes of light as was the case with the other television set." Then turning to Jim, he continued. "Throw the other set back on, Jim, and while you do that I will watch all of old Jolsen's actions by tapping his ray with the spare vision projection set. Forrest, you had better watch the scene for more disturbances."

Again the view of the mysterious, shrouded air craft was thrown onto the wall screen while the detective used the spare reflector plate to obtain a view of the wizard in his laboratory. There was now an orange glow visible on the under part of the cloudy mass surrounding the raider's air vessel. The whole lower portion of the enveloping substance was now a mass of dull orange color, while the rest remained white, with the exception of tinges of orange hue caused by the reflection of the color of the lower portion.

Stepping away from the switchboard, the detective joined the chemist in front of the screen.

"I am positive, Forrest, that we are about to witness a demonstration of one of the wizard's most powerful weapons, although what it is or how it works I have not the slightest idea."

"But if he detects the television units that you have planted at the scene, our little show is going to have a sudden ending; for it's reasonably certain that he would not demonstrate before our eyes if he knew that we were watching, especially as he is going to such trouble to work unseen."

"If he knew that we had seen as much of him as we have, we wouldn't remain alive for one minute. He would, just as he told us, kill us on the spot. You are really taking an awful chance with your life, Forrest, in working with me on this case, for one slip will mean death to us all. As far as the detection of our television sets is concerned, however, I am sure that we are safe, for when we switched this present television set back onto the screen, I watched the wizard closely and he made no sign that he had detected any disturbance. He was at his table in the laboratory at his base when I tapped his beam just now, which shows us that he is not with his men but is following his old style of directing his men from his headquarters. Now, if he had detected any unusual disturbance on his beam he would have been instantly alert, and would have commenced juggling different controls at his finger tips until he had determined the source and cause of the trouble. The reason that the other television unit does not register this disturbance is due likely to the fact that it is surrounded by the heavy iron case. His vision beam probably uses up all of its strength in penetrating this metal shield, rendering its waves too weak to cause any disturbances on the television set."

The detective said no more but watched the flickering and flashing television scene before him thoughtfully. Suddenly he straightened up and turned around to Rogers who remained at the controls on the board. "Jim, is the old magnetic ray detector active?"

The Coming Of the Raider

THE unexpected question struck the ears of the other men with a startling effect.

Jim turned his attention to the board, and the look of surprise that crept over his face told the others of his discovery before he had a chance to reply;

"By Jove it is. The pointer is clear over to the right of the scale."

"And the other old ray detector on my desk?"

"It is energized also."

Riel turned again to the scene before him. In spite of the quivering flashes of light that continually crossed the screen, a glimpse of it could be obtained sufficiently to enable the watchers to follow the movements of the air vessel. A golden ray of light was now projecting downward from the glowing mass of cloud, emerging from some unseen spot in the lower part of the craft.

"Jim," Riel again addressed his assistant, "Work fast and get a scene of the street in front of the warehouse by lowering the elevation of the vision set. As soon as you get that, cut out the scene of the wizard's laboratory from the other reflector plate and use it to get the other vision set operating. We will need them both now, for we can't afford to miss a single move."

A view of the dark silent street was soon before their eyes, a street completely deserted of life with the exception of a man huddled up in the centre of the roadway.

"A close up of that man, Jim," Riel's words cut the silence of the room. "He seems to be sleeping, Forrest," he continued, addressing his elder companion, as a close up view of the huddled body was put on the screen, "a man will seldom pick the centre of a street to sleep in unless he is completely drunk or else overtaken by some affliction, making it impossible for him to get out of the street."

Again turning to Rogers, the detective addressed him.

"Put a view of the whole warehouse and the air ship on the screen, and hurry, for we've got no time to lose."

The adjustments were quickly made, and the men soon looking at the new setting before them with growing interest. The raider was idly floating in the air about two hundred feet above the building, and its shaft of orange light was producing a bright circle of light in the centre of the flat roof of the building.

"All right, Jim, now throw the other unit on," the detective's voice rang out through the silent room again.

For the next few moments they watched the interior of the warehouse, but all was dark and silent. Suddenly Forrest leaned forward, his eyes scanning the scene closely.

"Riel, can you make out a faint streak of orange glow reaching from the floor to the ceiling over there a few feet from my multi-picture instrument?" he asked.

"Yes, and it is gradually getting brighter. It is their ray above penetrating through the roof."

Rapidly the faint glow brightened, becoming richer and denser until a thick orange-colored beam, similar to the one reaching down from the craft to the roof, was stretching from a spot on the warehouse ceiling straight down to the floor.

"Look!" Forrest gasps, staring at the view before him, "The roof is swaying. See it, Riel? God, a whole section is falling."

As he spoke, a great area of the roof suddenly gave way around the spot where the beam passed through and crashed upon the floor below, leaving a large circular gaping hole through which the ray now passed from the air craft above to the floor of the building below. Scarcely had the section of the roof fallen than Jim, who had now deserted his place at the board and was standing beside the others, gave a grunt of surprise and pointed at the ray.

"Look, there's an oval-shaped object passing down the beam," he exclaimed excitedly, "And there's another one. Good God, they're spooky looking things."

Two dark shadowy shapes were slowly floating down the beam towards the floor of the building. Long oval-shaped shadows about six feet long and a little over a foot wide. Lightly the first one touched the floor and remained in an upright position while the second slid down beside it. Three pairs of eyes were riveted to the two objects that were smothered from view in the thick orange mass of the beam.

"Heavens! They're moving!" The excited voice of Jim Rogers again broke the silence.

"They are just human beings," Riel replied quietly, "Servants of the wizard."

The vertical beam had now grown dimmer, enabling its two inmates to be seen more clearly. The heads, arms and legs of the two men soon became visible proving the correctness of the detective's statement. The whole head was covered with a sort of helmet with no visible openings but the bulging eye glasses that stuck out from the curious covering, producing a wierd appearance. A wide belt was worn around each waist, and a couple of curious objects were fastened to each. The complete body from the neck to the soles of the feet, was covered with a single piece of material, and not a break or seam could be seen. Both men were completely covered, not an exposed piece of flesh was visible. An independent glow of orange light could now be seen around each of the two men as the ray faded away.

"Jim, get a close view of those men and watch their actions closely," Riel instructed his assistant, without taking his eyes from the scene, "We must determine the manner in which they will attempt to remove the device."

The adjustment was quickly made, and the base of the ray along with the two men and the machine nearby were now in plain view before their eyes.

The two intruders tinkered with their belts a moment causing the glow that surrounded each, to disappear. Having done this, they stepped over to their objective, the multi-picture machine. As they approached the apparatus, leaving the faint circle of light that the ray was still producing, the beam itself suddenly brightened to a blinding white color, flooding the entire interior with its dazzling light. Without a moment's hesitation, the two men went to work. The one, taking a short round tube from his belt produced a narrow blue flame at one end of it, and applied the flame to the cluster of wires that connected the apparatus to the control panels behind it. Both the copper, and steel resistant circuits, large and small, melted and snapped apart at the momentary touch of the slender blue flame.

What the Raider Did

THE buzzer on Riel's control board now sounded the alarm, but no one paid any attention to it. All eyes were on the scene before them. They saw the second man take from his belt a slender arrow-shaped shaft connected to the belt by a piece of flexible wire, and kneeling at the base of the framework point the rod at the bolt heads that fastened the frame of the device to the floor. The heads of the bolts crumbled under the effects of invisible force, and fell apart as dust.

Their work completed, the one man touched a white button near the front of his belt. Instantly the bright ray disappeared, and the deep orange beam replaced it. But now it was shifting as the craft above changed

position. The multi-picture apparatus was about twenty feet west of the gaping hole above, but the vessel had now shifted until the ray was seen entering the opening at an angle and was already enveloping the men and the machine. The two men who had by now turned on their individual glows again, took up positions on opposite sides of the machine, taking a hold of it each with one hand. As the beam grew denser, both men and machine became but dark shadowy objects. Then the most startling spectacle of all occurred, for the men began to float up the beam with the heavy machine between them. Slowly and silently the ghostly shadowy objects rose up the ray, and passing through the gaping hole in the roof, faded from view as they approached the golden mass above.

For a few moments the three observers stood gazing at the glowing shaft of light, then Riel's voice stirred them to action.

"Put the other set on, Jim, and give us a view of the ray and the ship too."

Just as Rogers turned around to step up to the control board, an exclamation from Dr. Forrest drew all eyes to the scene again. Jim turned just in time to see the entire roof of the warehouse collapse and crash in.

"Quick," Riel's voice rang out. "The other scene, Jim."

The trained nimble fingers of Rogers fairly flew among the controls of the board, and in a few brief moments they were gazing at the motionless, cloud-enveloped vessel and its mysterious ray.

They were just in time, however, to witness another amazing spectacle. The beam suddenly brightened again to the dazzling white, and then turned to a vivid crimson color. A display of sparks drew their attention to the bottom of the ray where it touched the building. All inflammable material immediately ignited at the touch of the fiery ray, while the ruins of the metal roof turned hot at the point of contact. Up and down among the mass of ruins the ray began to swing, sweeping the wooden walls and leaving a blazing smoking strip of charred ruins in its wake. In a few minutes volumes of smoke were pouring out of crevices between the broken pieces of the roof that covered the floor as the flames spread among the paper and boxes below. Meanwhile, blazing walls lit up the area around with their fitful light. Suddenly the beam disappeared, and an instant later the orange glow beneath the cloudy mass surrounding the air craft followed suit, leaving a small patch of cloudy mist to be seen in the sky above. This commenced rising vertically and soon disappeared into the night.

Below, a solitary man was rising from the street where he had lain huddled in a heap during the raid. And looking around in a dazed manner at the devouring flames near him, he raced down the street to sound the alarm.

"Well, boys," Riel placed an affectionate hand on a shoulder of each of his companions, "That's over with. We have by means of a little brain work, outwitted the mighty wizard. In doing that we have learned a great deal about him. We have seen him make use of weapons that none of us would have ever dreamed of his possessing—weapons by which he can easily back his demands when he begins to broadcast his commands to the world. We have found out what we may expect to have used against us should we tempt the old man to action, but in so doing we have put our own lives in a most dangerous position."

The detective paused a moment as he shut off the instruments on the board.

"When old Jolsen examines the device that he just took with him," he continued, "and learns of its usefulness, his first desire will be to send us three into the next world. His intense hatred for those who cross him will flare up and his fingers will itch to try his infernal apparatus on us, especially me, who he knows is at the bottom of it all. He also knows that you are working with me too, Jim, which places your life in the same dangerous position. Also he knows that you, Forrest, played an important part in the outwitting of him to-night. Therefore our next move must be made quickly. We must all get away from here and out of his sight before he discovers the trick, for it is quite probable that by noon this place of mine will be the target of his most deadly weapons, and there will likely be nothing left of it when he is through."

"But where do we go, and what can we do by simply hiding?" asked Jim.

"You two will have to get out of his sight and remain completely hidden if you have any value for your lives. It is up to me to play the next move alone. After what we have witnessed to-night, I am convinced that there is only one way to deal with him. We must first discover the exact location of his base, and then plan a means of getting him away from his instruments long enough to finish him before he gets a chance to use them. The power of this man is almost beyond belief, and nothing short of a miracle can save the world from him."

"Did you find out as much about him as you had hoped to?" asked Forrest.

"We have learned a great deal about the wizard to-night," continued Riel, "For instance, the man that we saw huddled up in the street was sent there by headquarters, at my request, and through him we found out that old Jolsen was using the telepathy ray again. I suspected the wizard's telepathy ray would be used and I employed the man as a means of finding out. He wore no head protection of metal, and when the ray was turned on him he sank into a deep sleep right in his tracks. Also I found out that the vision ray was turned on before the telepathy beam, which is sufficient proof that he carries the telepathy ray on the other one. However we need have no fear of that ray, it's his new devices that we have to worry about."

"But can you explain yet, the disturbance that his vision ray caused on our television system?" Forrest asked, "when there seemed to be no way to detect that ray in its original form?"

"That disturbance was not caused by his vision beam, but by the telepathy ray that he was using on the other. It's the telepathy ray that our old type ray detectors here on the board detected and caused all the other magnetic disturbances. We not only have learned to-night that he has the telepathy ray among his equipment, but that he also has a fire ray, a gravity-defying ray, a mysterious force by which he can crumble buildings, besides the vision beam and interplanetary set. The fact that we can only see a part of his laboratory, enabling us to see only a few of his control panels, and none of the wiring and connections that are behind all the panels, prevents us from studying his instruments and their construction. The fact that he is a master of gravity, leads me to believe that he propels his air ship by the same power making it possible for him to go as far and as fast as he wishes. If this is true, then it is but a trifle for his ship to

jump across the ocean or circle the earth. He is undoubtedly the world's master of gravity, master of vision, master of time, of speed and to a certain extent still master of man's brain. And his next step is to become the master of the entire earth.

"But time is passing and our very lives and those of our fellow brothers on this planet depend upon our ability to work fast. Now, Forrest, for the safety of your own life, put someone in charge of your affairs and travel disguised and secretly to some other part of the continent and hide from all possible detection of the wizard's ray. You have been a great help, Forrest, for it was due to your clever work that we have been so successful. The biggest favor that you can do for me and the world now, is to disappear—drop completely out of the wizard's sight. However, keep in touch with Inspector Watson of central headquarters so that if I have need of you in the future, I will be able to find you quickly.

"As for you, Jim, I have already arranged with headquarters in connection with the plans of my next move, believing from the first that such a move would eventually have to be made. I mean to locate the master mind's base, and land unnoticed nearby in hopes of finding some way of trapping him. I have a letter here that you will give to Inspector Watson as soon as you get to headquarters, and he will see to your safety until I have further use of you. But before you leave here, see that the police guards and the servants are all removed from the building. Allow no one to remain here after daylight, and have the officers watch the residence from a safe distance to prevent anyone approaching. It is now four o'clock and daylight is already breaking; and as every minute is of the greatest importance I am leaving right away. I will take a Torpedo Express liner for New York and will get some sleep during the passage. It will take the wizard a few hours to unravel the complicated wiring of the device that he took from the warehouse, and that will allow all of us sufficient time to do our parts, and each get out of sight before he finds out how he was tricked. My only fear is that he may take vengeance by a wholesale slaughter of innocent inhabitants, for that man would not hesitate a moment to smash London to ruins. Well, ring for the plane, Jim, while I get my hat."

CHAPTER VII

Tracking the Wizard

EARLY on the morning of the 24th, a light, swift plane sped through the thick rolling banks of fog that swept over Newfoundland. The fog allowed only occasional brief glances of the land below to be obtained by the pilot, who drove the speeding machine through the rolling masses. Most men would have hesitated before starting on a long air trip over wild thinly-populated territory under such weather conditions, but to Detective Riel at the controls of the little craft, it was but part of the work that was expected of him.

The instrument board of the speeding plane was far more complicated and contained many more controls than the ordinary private flying machine. The board was in fact thickly covered with controls, switches, meters and other indicating devices which were occupying a great deal of the detective's attention. As his eyes rested on the nameplate of the panel which contained the four letters, A.A.P.P., his thoughts went back to the previous day when he had landed in New York on the Torpedo Express line and had at once hurried to the central office of the Atlantic Aerial Police Patrol. He remembered the anxious hours that he had spent during the rest of the day and part of the night that he had spent watching continually for a sign of the wizard's ray, while the patrol plane was being equipped with additional apparatus under his direction.

The detective looked at his watch. It was just 7.28 o'clock. At 7.30 he would receive test signals from London, and at 7.40 similar signals from New York. Adjusting his headset more securely, he made a few minor adjustments of some of the controls in front of him and leaned back in his seat to wait for the first expected call. He had not long to wait, though, for promptly at 7.30 by his watch, a faint buzz was detected in his ear units. Quickly adjusting some controls on the left of the instrument board, he rapidly built up the signals until they could be heard plainly.

After satisfying himself as to the tone and strength of the signals, he threw a two-way switch over into its other setting, causing his head units to be disconnected from the one radio instrument that was mounted on the left of the instrument board and connecting them up with the second set that was built into the right end of the instrument panel. At 7.41 by his watch, the signals of the New York station sounded in his ear units, a series of dashes of three seconds' duration at intervals of ten seconds, and he quickly adjusted their reception strength to his own satisfaction.

On through the dreary morning flew the plane, diving from one mass of whiteness into another. Riel reached over to the instrument board and turned the dial of the electrical heating control on another point as the cold damp air began to make itself felt. Then banking the ship slightly, he caused it to trace a great circle through the sky. Apparently satisfied with things, he settled back in his seat more comfortably, occasionally switching the circuit of his head units from the one reception instrument to the other. There was nothing to do now but cruise around and wait until a signal from one of the stations informed him that the wizard's ray was on their city. The only possible means of finding the base of the master mind was by tracing the vision ray, a task that would have to be done carefully to escape detection. He was prepared to stay in the air for ten hours more, and felt positive that the wizard would use his ray on one of the two cities within that time.

His thoughts were suddenly interrupted by a clear distinct signal in his ear units as he threw the switch over the set that was adjusted to receive the New York call. Instantly his eyes went to the chemical ray detector which he had mounted on the board before him. The needle was faintly agitated, but due to local electrical and magnetic disturbances caused by other instruments on the board, the ray had little effect on the indicator. Quickly he connected his head units to the powerful amplifying apparatus mounted on the centre of the instrument board, and after a few adjustments detected a faint hum in his ears as the feeble impulses that were set up in the coils of the ray detector were amplified through the apparatus and passed to his ear units. Careful adjustment of the controls soon produced a trifle louder buzz, then realizing the need for speed while the ray was on the air, Riel turned the ship's nose toward the coast at full speed. Gradually the strength of the signals increased until they were

so loud that the amplification control had to be cut down. A short distance farther on was the coast, and the detective, catching sight of the barren rocky shore, turned into a great circle, carefully examining the ground below at every opportunity. A break in the clouds revealed to his eyes a cluster of buildings about a mile north of him and close to the coast line, and he at once began to look for a safe place to descend. As he slid lower toward the ground to obtain a closer view of the land, one of the motors missed, coughed sickly and died out. The second motor followed suit and stopped, causing him to switch on the emergency landing motor. But scarcely had it turned a hundred revolutions than it too dropped in speed and stopped. Fortunately, a parting of the misty banks below showed a clear unobstructed stretch of land, and in a few more moments the plane had dropped safely to the ground.

Removing his head apparatus, Riel shut off some of the instruments before him and stepping out of the plane, looked around. The fog was exceptionally thick and heavy at the surface of the land, and it was impossible for him to see more than twenty feet at times. That he was close to the base of the wizard he had little doubt. He was sure that the buildings that he had just seen were those of old Jolsen. He was also positive that the failure of his motors was due to his having flown into a protecting screen of some sort that surrounded the wizard's base, paralyzing the motors in some way and forcing him to land. Determined to reach the cluster of buildings that he felt sure were those of his man, Riel started out through the thick fog in that direction, but scarcely had he gone thirty yards when a voice sounded behind him, and turning around he found himself looking at a rifle held in the hands of a rough-looking individual dressed in seaman's clothing.

"The boss is waiting to interview you, Mr. Riel," the stranger addressed him, "So just continue walking ahead in the direction that you was goin' in. And remember that even though you were to overpower me, you would never escape alive, for the eyes of the master mind are watchin' you as close as mine are."

After a five minute walk they approached a long two story neat-looking brick building, which was approximately a hundred feet long. Toward one end of the side wall was a large arched entrance, toward which the two men were walking. To the south of this building was another. This was a one-story structure used probably to house air or road machines

Passing through the entrance, the detective was conducted along the hall to a stairway and up this to the second floor. Pausing before a closed door, his captor pressed the door button and turning around, departed, leaving his prisoner standing there. Suddenly the door opened and he found himself face to face with the grey-haired master mind, Jolsen.

"Good morning, Riel," the unwelcomed host greeted him with mock courtesy, "It is indeed good of you to honour me with this visit. Step inside and make yourself comfortable."

Without replying, the detective stepped into the room before him, and at sight of the mighty display of scientific apparatus within, was unable to hide the look of admiration that came over his face. The room must have covered nearly the whole upper floor of the building, being fully as wide and nearly as long. The door through which he had entered was at the north end of the room, and the whole laboratory lay spread before his eyes in one grand outlay of glittering apparatus and equipment of all description. In the centre of the room lay the long heavy table with its dozens of controls embedded in its polished surface, that he had seen previously. Along the left wall was a long marble bench thickly covered with the greatest display of chemical equipment that he had ever laid his eyes on. Along the wall on his right, ran another work bench, which was covered with electrical equipment of all sorts, while above the bench was the long row of white marble panels clustered with electrical equipment, and above it was the large picture screen, both of which the detective was quick to recognize as the ones he had seen before from his own home. At the far end of the room was the mammoth switchboard, taking up almost the entire space between the side walls of the room and reaching up to about seven feet in height. Other pieces of apparatus were suspended from the ceiling or mounted on the walls and a few individual instruments were mounted on small tables which were scattered over the floor, some of which were attached or connected to panels over the electrical bench, by conductor cables.

"Well, Riel," Jolsen motioned his prisoner to a chair, "I am glad that you decided to call on me, as it saved me the trouble of coming for you. I have a proposition to offer you, Riel, and if you will just take a seat I will explain it to you."

"There is only one condition under which you can reach any agreement with me," was the detective's reply.

"And that is—"

"That you use your infernal apparatus for the benefit of humanity, instead of planning to annihilate your fellow men to realize your own mad ambitions."

"That is exactly what I am thinking of. You, Riel, can prevent the slightest bit of blood-shed by your cooperation with me."

An Offer Refused

THE sleuth remained silent and Jolsen continued. "Riel, I am not only master of every man on earth, but can make man and beast both obey me. I am master of all life on this planet. I have here in this room, instruments that no man ever dreamed of before, devices by which I can blot out the entire human race. But it is not my wish to cause needless blood-shed and suffering, although I am afraid that to make the nations of the earth accept me as the supreme and only ruler of this planet will necessitate a few demonstrations of my power. I will be compelled to make the world recognize me by force, and it will probably mean the slaughtering of countless thousands of inhabitants before the rest will turn from the leadership of their respective governments and recognize me as the ruler of the earth. However, with your assistance I am sure that I could win the majority of the civilized races without so much trouble. You have a name and a reputation that the whole world envies and when you speak your words are given serious thought. Under my direction, assistance and protection you will return to your home and tell the world of my power. Tell them the advantages of a single ruler reigning over the entire planet, and warn them that their refusal to recognize me and obey me means death. I will back up your words by an occasional demonstration of my ability to destroy the earth and every living thing on it. When I am fully accepted and obeyed as the lone ruler of the earth, you will become my right hand man.

Under me you will be able to govern, and dictate to the entire globe."

"Your fascinating offer does not interest me in the least, Jolsen. My duty is to put you where the world will have no further need to fear you. Your array of apparatus that you have here, does not prove that you are yet the ruler of the earth, and if it did, you could not make me betray the trust and confidence of my fellow men for all the honors and riches that you could offer."

"I see that I must thoroughly convince you that the world is my power before you will listen to reason. So before we proceed farther with the discussion, allow me to introduce you to some of my equipment."

As he spoke, the wizard stepped over to the centre of the well-equipped electrical bench, and placing his hand on a small looking control cabinet that sat on the bench, turned to the detective.

"This small box," he explained, "With nothing to be seen on the outside but two calibrated dials and an arrow-shaped steel radiating pointer extending from one end of it, is an innocent looking device but in reality it is quite deadly. With it alone, I can reduce the mighty cities of your civilization to ruins if I wish. However, I did not develop it for that reason. I do not expect it will be necessary to use it for I have other weapons more deadly than it."

Picking up a small piece of steel, the old man handed it to Riel for examination.

"A small chunk of ordinary steel," he continued to the sleuth, "that I am going to place under this microscope here. Now if you'll look at it through the microscope, you'll find that the surface that appears quite smooth and solid to the naked eye, is in reality quite rough and porous when magnified greatly."

"Naturally it will look rougher and as you say, porous, when viewed through a powerful glass," the detective replied as he adjusted his eye to the glass, deciding to show an interest in the wizard's instruments, in the hopes of finding out how they worked. "But that is the way with everything when greatly magnified."

"Yes, but in this case I am referring directly to steel. Now this cabinet contains a device that I call my Decomposing Ray. This ray is produced from a light obtained by passing an electric current through a fine wire of special alloy which runs through the bottom of a glass globe partly filled with a chemical mixture. Now, by passing a high frequency current through this wire, bringing it to a white hot state, a vapour of vivid brightness arises from the chemical and fills the rest of the globe. This produces a bright light that looked at directly would ruin your eyes, because of the deadly elements carried in the light waves that the electro-chemical vapour produces. This light I discovered in my search for better illumination, and it is this that I am now using to illuminate this room. Now, however, I am deflecting the light onto pale blue reflectors, which remove the harmful effects of the direct rays and produce a soft soothing light. But to return to the subject. I am going to pass a light beam in this cabinet through a strong pulsating magnetic field and then directly onto the metal cube that you are to watch. I want you to examine the piece of metal closely while it is subject to the ray."

The detective readily turned his attention to the microscope. He gazed intently at the rough chunk of metal before his eyes as his host snapped a switch into place on the small cabinet. Closely he watched the rough surface of the piece of steel and noticed that the view became slightly foggy and blurred. There seemed to be a slight disturbance in the air, causing the eye to make false observations. Suddenly his eye was attracted by a slight movement of a minute fraction of the metal that appeared to have fallen from its place on the side of one of the pores into the bottom of the hole. An amusing incident, he thought, when he tried to imagine how a piece of metal could have jarred loose as it lay still on the bench, after being roughly handled but a moment ago. But again his sharp eyes caught the shifting of a minute piece of metal, or was it imagination? He examined the surface carefully and noticed with surprise that the porous holes and cracks seemed to be increasing in size slightly. He took his hands off the instrument, fearing that he had changed the adjustment in some way, and again looked at the object carefully. Again and again he was positive that he saw small particles of metal move and shift, and many of the minute excavations seemed to be growing a little larger. Suddenly the faint mist seemed to dissolve and the cube of metal before his eyes could be seen distinctly again.

Jolsen's Boast.

"DID you notice anything unusual?" Jolson's voice sounded behind him.

"Nothing startling," was his reply. "The object seemed to grow a bit distinct and less clear after you turned on the machine, but I suppose that was due to an optical effect caused by looking too long at the object; or perhaps your ray produced a disturbance in the air between the glass and the object."

"And did you notice anything else?"

"Well, I imagined that I saw particles of metal falling from their places, but that impression was probably caused by the imperfect vision, which in turn I suppose was caused by your device, or, as I said before, by an optical effect due to eye strain. Outside of that I saw nothing unusual."

"You saw all that I expected you to see. You saw the means by which I caused the Empire Building to crumble and fall."

The detectives' eyes opened in amazement. He made no attempt to hide the effects of the other man's words.

"What! You mean that you caused the steel of that building to crumble with a device like this?"

"Absolutely. Just as you observed in the microscope. The improper vision was caused by a faint gas that was produced by elements of the ray combining with elements of the metal. Certain properties in the metal are altered by the action of the ray, weakening the metal and, as you yourself saw, causing minute particles too small to be seen by the naked eye, to break away completely. Then when a high-powered ray is used, the metal deteriorates so effectively that its strength can be reduced sufficiently to cause any structure to crash, just as the Emipre Building did, and just as others will when I begin to demonstrate my powers."

"Heavens, if you are not the devil himself, you are surely his true servant. Haven't you a single device among your infernal collection that was designed to be used for the benefit of the human race, instead of its annihilation?"

"All my equipment will be of benefit to the human race. It will raise the level of civilization beyond the visions of the most optimistic dreamer. I, as the ruler of this planet, will lead its inhabitants in a few years to a stage of civilization that will not be reached by opposing, fighting and hindering one another's progress.

The day has arrived when the possibility and necessity of a single ruler of the earth must be considered."

"And none but you, I suppose, are capable of wearing the crown."

"I am best fitted for the task. I am the most powerful man on earth. No other man can do as much for this planet as I can; can make it safe from celestial attack, or protect the peaceful races of the earth from attack or trouble by those who may attempt to promote war or cause other trouble from time to time. I am best fitted for the task, Riel. I will unite the nations of the earth and later the planets of the solar system. I, alone of all men, will be first to be ruler of this planet, and I, alone, will rise to heights that man dared not dream of before, that of Ruler of the Solar System. It has been my lifetime ambition, and now with the goal within sight I will tolerate no resistance. I will gladly kill or annihilate all who stand between me and my goal."

"The solar system?" Riel gasped, "God, now I know you are crazy."

"So you thought before when I claimed the title of the master of the earth. But you know well that I was once before in the position to become the earth's ruler, just as I am now undoubtedly the most powerful man in the solar system."

"That doesn't say much outside of your former claim, for this planet is undoubtedly the only inhabited one in the group."

"Wrong again, Riel. In fact I am becoming surprised at your ignorance in such simple matters of science. I know for a fact that one other planet in the group around our sun is inhabited. But I will explain that to you later. I will show you how I know that the planet Venus is thickly populated, and you will see for yourself scenes of life on the sister planet."

"You mean that you can see inhabitants and cities?"

"Ah! I see that you are getting interested in my work. Well, that is just natural. It is human nature to take interest in anything new. But to answer your question; yes, I can see their every day activities, as well as I can see those of this planet with my vision ray. Do you not envy my power, Riel? My ability to have two planets under my observation from my armchair? One already in my power and the other following when I finish constructing my space ship which will be in the near future. The propulsion force of my space ship is another product of my brain, a power discovered by combining the scientific knowledge of the two planets—a powerful weapon known to no one on either planet but me. My space ship will carry me from one domain to another, enabling me to visit the other planets and rule them."

"Don't claim credit before you earn it, Jolsen. Once before you thought the earth was at your mercy, but it is carrying on as usual."

For a moment the face of the wizard reddened with anger, but he quickly controlled himself and replied quietly.

"I see that I must prove every statement that I make in order that you may believe me. Very well, I will. Riel, I will prove to you that I am dictator to every form of life on this planet, that I can control and dominate every being that moves. And when you see this done, Riel, there will be no further hope for you to cherish. You will see without a trace of a doubt that I am master and ruler of all life upon this planet."

"There are many different forms of life upon this earth, Jolsen."

"Yes, and as my assistant, Riel, you will have the power to give orders to them all. Every man and beast will obey you. Think it over, Riel, while I prepare to prove to you what I have just said. No other man has ever had such a chance, and no other man would be fool enough or blind enough to ignore it."

Leaving the detective to his thoughts, Jolsen walked across the room to the chemical work bench and picking up two covered animal cages off the floor, set them on the bench.

"Well, Riel," he turned to the silent detective again. "Just in case that you still think I am unable to carry out my word, I want you to step over here and watch these two cages." Removing the covers from them he continued, "In the one cage I have a lone rat, and in the other you see two rats. Now I am going to put at rest the question that I know is burning in your brain: whether or not I really have control over the animal world."

CHAPTER VIII

A Secret

"YOU have yet to prove to me that you have power over the human races, not mentioning the animal kingdom."

"This little exhibition that I am going to give you, showing my power over the animals of the world, will thoroughly convince you of my power over man."

Reaching under the bench, the wizard drew out two metal caps, handing one to his companion.

"Now, Riel, we'll make use of the metal caps with which you turned the tables on me a few years ago. That was your day, Riel, but this is mine. The smartest detective in the world is going to have to admit that he is beaten."

"If you are referring to me, I want to say that I would not advise you to think that I am outwitted. You are undoubtedly a dangerous man, Jolsen, in your way. But your way and mine are different. I warn you that at the first opportunity, I will throw you over without a warning. We are foes, Jolsen, foes to the finish, and all the power and fame that you can flourish before my eyes will not alter the case."

"Riel, I admire your spirit. It is for that reason I am so willing to make you the offer that you persist in turning down. You are the type of man that I need to carry out my plans. You are the man that I need to assist me in the great work of mastering the solar system. Also you are well known over the entire earth as being true to your trust and unfaltering. The last tilt with me has done much to win the respect of the world, and the majority of the civilized races would give any suggestion of yours serious thought, whereas they would completely ignore such suggestions given by another. It is not for my sake that I ask you to show the world that it must recognize me as the only ruler of the planet from now on. It is for the sake of the people. I am going to be ruler of the earth, Riel, and without someone like you to cause the people to reason things out and see the uselessness of resisting, they will not submit to my demands. They will resist me, and I will be forced to slaughter and crush until the remainder see the uselessness of holding out against me. Now put on your metal cap and I will show you beyond a doubt that the best way you can serve your fellow men will be to try and make them submit to my demands without useless bloodshed."

Stepping over the electrical bench, the wizard made

a few adjustments on some of the panels mounted on the wall, and then walked over to the large switchboard at the end of the room. Turning a dial on the board, he caused a bronze shaft that was mounted on the upper part of the switchboard, to swing around until it was pointing directly at the cage containing the lone rat. Returning to the table in the center of the room, he motioned Riel to a chair. As the detective took a seat, Jolsen picked up a stick on the floor, and stepping over to the cages on the bench, picked up the one containing the two rats—placing it at a distance from the other.

"Riel, I want you to notice what I do during the next few moments," he said as he returned to the cage with the lone rat in it. "I want you to note, especially, the condition of the rat during the time, for you will see strange things presently."

With the stick he commenced to tease and prod the cowering rat in the cage until he had the animal worked up into a blind rage. Savagely the creature bit and clawed at the tormenting stick, and glared at its tormentor with eyes blazing with hatred. But the merciless man continued to tease the caged animal until the creature, with frothing mouth, was almost insane with hatred and rage, and savagely tore at the stick as soon as it was thrust through the bars of the cage.

After about five minutes of this, Jolsen returned to the switchboard and opened a few switches and altered other controls, apparently shutting off some ray that he had been training on the rat by means of the bronze pointer.

"Now, Riel, we'll have to wait about fifteen minutes before we can complete the demonstration. Meanwhile I'll tell you how I developed my Interplanetary Vision Ray Receiver. However, I can claim very little credit for the invention, for I really owe the thanks to you."

"To me?" was the astonished reply.

"You no doubt remember the light wave receiver that I was trying to get from you during our last acquaintance. At that time it was supposed to receive signals from light waves. I wanted the device to see if I could possibly decipher the signals, and perhaps learn many important things in the messages. Then you found out that the signals that it was receiving were being sent out by a French wireless station that was experimenting with a new kind of a wave. You therefore let me have the plans of the device, using them to play your last card and beat me at my own game. You did well, Riel, and you deserve credit, more credit in fact than the world realizes, or has yet acknowledged. But to keep on the subject. As soon as I found out that the waves that it received were local, I commenced to study the device, and started experiments in the hope that I could receive messages in a similar way from another planet.

"Using a new principle telescope to direct the light waves from celestial bodies to the device, I altered and tested the instrument until I received some mysterious sounds when it was trained on the planet Venus. So after careful work I amplified them up and recorded them on a special strip or recording film, to prepare to study them at my leisure. I tried for some time to make something out of the continuous varying sound that the device produced, when suddenly the idea came to me that I could put them through the electro-magnets of the vision set. I did, and obtained as clear a view of the surface of the planet as I could expect to see of our own earth. I then tried out other records of pulsations that I had saved up, and in all cases received scenes of the sister planet. Scenes of water, cities and stretches of open country; and in only two cases were the views of the planet hid by clouds, which are a great deal denser than on earth. I then connected the two wires of the reception balance coil in the light wave receiver, directly to the amplification unit of the vision ray apparatus, and it to the two electro-magnets that produce the field through which the strong Colbert rays are passed onto the screen.

"The result, let me assure you, Riel, was a complete motion picture of the scenes of the planet. Also by an arrangement with a second light wave receiver, I was soon able to pick up small sections of the scene, and after passing the pulsations through another amplification device, built up the pulsations and changed them back into light waves with a second vision projector, throwing the vision onto a large screen, the one that you see there on the above electrical control panels. So now I can pick out any individual part of the surface that is turned toward us, and throw the scene on the wall as plain as any radio vision pictures is seen in a theatre. Later I will show you some of the views of the sister planet, and you will see scenes of the two races that exist there. One is a race of beings more intelligent in many ways than our own earthly inhabitants; and a second race consists of a sort of intelligent beast, a creature with a brain almost as cunning and clever as a human but with the body and disposition of a beast. I have witnessed two different conflicts between these two races, and it is apparent that the Venusians are forced to fight continually for their existence. Some day in the near future I will go to Venus and lead the civilized forces against their savage foes, using the best scientific instruments, developed through the combined knowledge of the two planets.

"The instrument that you see on the table there is developed sufficiently to enable me to use it as a deadly short range weapon, and which I hope to soon be able to use at greater range in the form of a ray. I call it my heat ray projector, a device which, when completed, will be a very deadly weapon of war. That model there, with which I am at present experimenting, will project a ray thirty feet with sufficient heat to turn a one-inch plate red hot. The shaft that you see projecting vertically from the top of the cabinet for about fifteen inches, supports the projector, which is the pointer that you see balanced horizontally on the top like a large compass needle. The position of the delicately-mounted projecting pointer is controlled by a set of electro-magnets that are mounted on the inside of the cabinet, in a circle below the projector.

"However, I wish to claim no credit for the construction of this device. I learned to construct it from watching the Venusians, who use the ray in a short range pistol, but built compactly for side arm use. I have, though, produced a hotter and deadlier ray than is used by the inhabitants of the sister planet in their war with the fierce creatures that are continually attacking them. Already I have constructed a number of arms for use against the creatures of Venus. It will remain for me, Riel, to teach our distant brothers how to build and use weapons to overpower their enemy with, an art that they seem to be ignorant of. You, Riel, will have but to swear your loyalty to me to become the right-hand man of the Ruler of the Solar System. You will have the pleasure of seeing every man and beast on earth do your bidding. You will have the thrilling experience of assisting me in teaching and governing the Venusians, and later in

exploring the rest of the solar system.

"Doesn't it awaken the blood in you, Riel, the thought of being able to dictate to the whole solar system? What greater power could man wish for? What vaster domain could be possible? It is mine, Riel, mine for the taking and you will be a fool to refuse my offer, and a greater fool to continue your feeble opposition to my work. The conquest of the solar system is within my grasp, and you will either assist me in my work by convincing the world powers of my might, which a man of your standing alone can do, or you will see your fellowmen torn, crushed and mangled without mercy. You will be forced to witness scenes that will warp that fine brain of yours, and transform the world's cleverest and coolest detective into a raving maniac."

Riel's Answer

"YOU have my answer, and your fancy dreams cannot change it. Your damnable plans are easy to recite, but the present Ruler of the solar system will decide what our future plans are."

"The present Ruler?"

"Yes, the one and only ruler of the solar system. The Ruler of the universe."

"Riel, you amuse me with your religious and superstitious ideas. Man can accomplish anything by use of the brain, and by my brain I will rule the solar system. I, alone, and no other will master the planets that revolve around the sun."

"You have yet to show me that you can master the earth, without entertaining me with fairy stories about your power over the rest of the planets."

"Very well, Riel, we will complete our experiment with the rats and, after witnessing that, you will have no further doubt that I am capable of doing what I claim."

Stepping over to the massive switchboard, Jolsen made a few adjustments and, returning to the table, seated himself in a chair facing the caged rats. Adjusting his metal cap, he motioned the detective to do the same.

"You have perhaps guessed by now, Riel, that I am experimenting with the telepathy ray, the device with which I once had the world at my mercy, and which I will use again in finishing the job."

"Your power with the telepathy beam is over," confidentially replied the detective, as he took a seat and turned his chair so as to be able to see the two rats that lay peacefully in their cage. "I have spent most of my time since your last wild rampage in preparing for another such attempt by you with the ray. I have not only been able to make governments see the need of making laws to the effect that every citizen own one hat or cap containing a metal lining which is proof against your beam, but the idea has become a style and hats are now turned out that are not only proof against your beam, but are also comfortable to wear and are as stylish and good looking in appearance as others. Of course, I admit that if you were to suddenly throw your ray onto the world you could create an awful havoc by turning those whose brains were not protected, against the rest of the world. You could create an awful slaughter and much bloodshed, but in the end the organized forces, protected from your damnable beam, would win out, and you would only hasten your own destruction by the attempt. I will admit that you were once master of the world, and had you not been so confident, could have given orders to any human. But that day is gone, Jolsen. You may as well quit for your most powerful weapon is now practically useless."

"Once again you are wrong, Riel, for I am about to show you how I will have your civilization battling for life against overwhelming odds, and I will use the ray that I used before. Only now I will use it in a different manner, and it will take more than a metal cap to save your world this time. Riel, you won the last tilt, but I will make sure that this one is mine. You will see your civilization go under mangled and bleeding unless I am recognized and respected as the sole and only ruler of the earth."

The cold grey eyes of the wizard surveyed his companion with his insanely leering look. But seeing that the other did not care to continue the discussion, he turned his attention to the multitude of remote controls imbedded in the table before him.

"Before I turn on the ray," Jolsen was once more the interesting scientist, "I want you to observe the cage containing the two rats, for it is on them that we are going to experiment this time. You see, Riel, they have little affection for us humans and crouch in the corner of their cage farthest from us, for they are afraid of us. I want you to notice this fact particularly, for they will act different presently."

In another moment the invisible ray was switched on, and the projector trained on the two rats. The detective watched the two creatures closely. Had the wizard really found some way to use the dreaded ray on the two rats? He doubted it but, then again, he knew old Jolsen well enough to know that he could do what he claimed. Perhaps the old man had found a new use for the beam.

Under the effects of the ray the two rats soon grew restless and irritable. One rose from the corner where it was lying and walked around the cage, its teeth showing in a snarl. The second followed its example, and it was soon evident that they were working themselves up into a rage. They approached the side of their cage nearest to the two men, thrusting their claws through the spaces between the wires, their lips curled up in wicked snarls baring the sharp savage teeth as they gazed with hatred at the two men watching them. Wilder and wilder grew their rage, froth formed at their mouths, and the two rats made repeated attempts to reach the men with their claws and teeth, attacking the bars desperately.

"What do you suppose would happen, Riel, if they were released from their cage?"

"I believe they'd drive us from the room," was the frank reply of the astonished detective. "They seem to be centering their rage on us or else it is your ray machine that is drawing their hate."

"It is not the machine or the ray that they are bitter against, it's us. Watch!" Jolsen walked around the cage and approached it from the opposite side. As he did, the creatures turned and rushed toward him, their rage increasing as he drew closer. They clawed and bit at the bars with their frothy mouths in a vain attempt to get at the man who stood there cooly watching their emotions

"You see, Riel," he continued, returning to his seat and turning off the ray, "The old beam is as deadly as ever, and more so, because this time the only salvation that man will find will be the privilege to go down fighting for his existence."

"What do you mean?" demanded the sleuth, looking at him attentively.

"I mean that with this ray, I can turn every animal

against man as easily as I turned those two rats against us just now."

Riel's face paled as the horror of the situation came to him. But he quickly recovered himself and replied:

"The fact that you can craze and disturb those two rats by putting a ray on them doesn't prove that you can do the same with all animals."

"Then I will explain how I control these creatures with the ray, and it will not be hard for you to see that the same can be done with all animals. First; animals, like humans, have their own reasoning power. They have a brain and, to a certain extent, use it just as a human does. Now, if I can detect a man's thoughts, as I have done, there is no good reason to believe that I cannot detect those of animals, for I have found that their brains radiate weak impulses just as a human being does. In fact I am sure that some species of the animal world communicate with one another by a sort of telepathy system."

"And you have succeeded in detecting the thought waves of a beast?"

"Exactly."

"But you cannot make up messages to force into a creature's brain as you can a human's."

"No, but I have a similar and more efficient method. I make the creature produce the thought waves that I want and then pass them through the brains of other animals of that type. That is what I did just now in my demonstration with the rats. You remember how I worked the lone rat into a rage against me by tormenting it. Well, with the apparatus, I detected, amplified and transformed the pulsations received from the rat while I tormented it, and later directed the ray against the other two creatures in the other cage.

"The beam was strongly amplified, in fact strongly enough to affect their own mental powers and plant the pulsations of the ray in their brains. Now the brain, controlling the body, caused the two rats to respond to the effects of the beam and show the same symptoms as the one that supplied the thought waves in the first place. You no doubt noticed that although the two rats were almost crazy with rage, still they didn't attack each other. They spent their hate in trying to get at us. That is because I teased only one animal, causing it to work itself into a frenzy against me. You will agree with me that the actions of the other two were exactly similar, which is proof enough that the ray as my servant makes me the undisputed ruler of the animal kingdom.

"To-day I experimented with rats, but I have on hand scores of records full of such wave messages received from many different types of animals while they were in a rage against man. And, since different species of creatures radiate waves of different frequencies, I can put onto the ray, the pulsations of as many different kinds of beasts as I wish, at one time; and with unlimited power in my hands, can control practically the entire animal world of the earth from my seat at the table here. Thanks again to Venus, for it is from her that I learned how to radiate energy at great distances through the air with little loss of pressure.

"The results that I will obtain by throwing the ray onto the animal kingdom of the earth will be truly amazing. Beasts the world over will rise against man with pent up rage.

"Lions, tigers, elephants and apes of the African jungles will sweep across the continent, devouring, tearing and killing helpless man as he flees before their savage attack, or is foolish enough to attempt to fight them off. The wolves, coyotes, bears, snakes and thousands of other animals will rise against their human masters all over the American continent. At a twist of my finger savage animals large and small will sweep their human enemies from the land, their jaws red with blood and their teeth bared for more. The jungles and wilds of South America will let loose hordes of man-eating animals that the combined skill and science of your entire civilization will be unable to stop.

"It will be a reign of terror, Riel, having no equal this side of hell, and I, Riel, will do all this from my chair with you beside me to witness the destruction of your fellow men.

"Riel, I have prepared four long years for this day but it is here now, and revenge is sweet. I will more than be paid in one day, the rewards for my untiring work of preparation. The world is going to feel my power this time and beg to come to my terms. I will waste no time in words but will give the entire planet a taste of my power. Then you will tell them through my visophone that they must ignore their respective governments and rulers, and look upon me as the supreme ruler of the earth."

Leaping to his feet, unable to control his emotions any longer, Riel glared at his antagonist.

"Good God, man, you have the soul of the devil, but I'll get you. I'll get you yet. You have led hundreds of innocent citizens to ghastly deaths but your day will arrive. Two huge air liners with their scores of lives have paid for your amusement, and dozens of other brave hearts have stopped beating because of your devilish schemes. But your time will come, and your death will be as ghastly and as horrible as those of some of your victims."

"So you suspected me of tampering with the Torpedo Express line, did you, Riel?" the cool maddening voice of the master mind replied.

"I know all about your activities. You removed the liners from their beam by means of your space ship and gravity beam."

Ready for the Horror.

A LOOK of surprise spread over the wizard's face, but he quickly concealed it, and replied in his usual cool manner.

"You really surprise me, Riel, with your knowledge of my affairs. However, the information will do you little good. Nevertheless you are correct. It was a very simple method of getting what I wanted from the air vessels. My large space ship, as I suppose you know, was rendered practically invisible by the mists that it surrounded itself with. By its unlimited speed it easily crept up over the torpedoes and by applying the gravity beam, drew the liner to it, and swiftly drew it up into the sky far above all traffic lanes, too high to be seen by any living being. And then it was carried here to my base where I was able to look over the cargo at my leisure."

"In other words, you murdered a hundred persons on each ship to get a few filthy pieces of electrical apparatus."

"The passengers and crews of the torpedoes died of exposure due to the extreme cold and lack of air in the high regions to which my space ship carried them. The torpedoes were equipped with atmosphere distributing equipment, but the effects of our gravity ray upset and wrecked most of the vessels' machinery, des-

troying both their air supplying apparatus and heating equipment. The result was that they were left with no protection against the rarefied and sub-zero atmosphere a few miles above the earth."

It was with difficulty that Riel could keep from leaping on the man in front of him. His brow was moist, he was undergoing a trying ordeal. He now fully realized, even better than before, the almost unbelievable fiendishness of the man before him, and he knew that the wizard was fully capable of creating the havoc that he boasted about. There was no further doubt but that the world's blackest, vilest and deadliest inhabitant was its master. The sleuth shuddered at the thought, but the years of training as a member of the world famous detective organization stood him in good stead, and outside of the one sudden outburst, he kept his emotion well concealed. Outwardly, he was again the calm, cool man of the law. There was still a chance of his being able to turn the tables on his opponent again, and he must keep cool and watch closely for that chance

"I have the ray all ready to turn on the world," the cool dominating voice of the scientist again interrupted his thoughts, "with an effective range of over three thousand miles, and the brain pulsations of 680 animals of different types ready to be thrown onto it. These records were taken of animals while they were worked up in an intense rage against man. We will adjust the vision beam on Africa first, and I will further increase the range of the ray to enable it to carry that distance. I will use the narrow needle beam first as it requires less energy than the fan beam, and I do not wish to bother connecting in any more vision tubes just now. We will get our location with the vision beam before we throw on the telepathy ray. Just take your seat at the table here and put on the mask that lies in front of you on the table. But I warn you to make no attempt to interfere, for I can kill you instantly. A shout from my throat will turn on a ray that will paralyze every muscle in your body, so remember that I am well protected. I am taking no chances with you, Riel. In fact I would have put you out of my way long ago, but for the pleasure of having you here where I can watch your tortured face as you see your fellow men fall crushed and mangled before your eyes. To see your face twist in anguish will be my greatest pleasure, Riel, my greatest pleasure."

The sleuth remained silent. Not by the move of a muscle did he betray what effect the other man's words had on him. His face was a mask. Dropping into a chair he picked up the curious contraption that was to serve him as a head mask, and coolly put it on.

The head apparatus consisted of a metal skull cap from the sides of which dropped two straps that connected together with a buckle; this was a chin strap to hold the device securely on the head. A mask passing over the eyes was attached to these two straps; this contained two pale blue convex-shaped glasses through which the wearer gazed, enabling him to see the small scenes of the reflector plate in a greatly magnified appearance. Also a mouth piece and ear units were fastened to the strap enabling the wearer to converse with his companion through the system,and also to hear the sounds of the scene before him.

As the wizard put on his own mask and moved his chair up closer to the control-covered table, his prisoner eyed the many buttons and dials before him. He would watch every control that old Jolsen moved, every button he pressed.

"In honor of your presence," the scientist's voice came to him through his ear units, "We will give your home city the first taste of my power, then we will visit the African jungles for a greater thrill. I am impatient to see your face twitch as you see the quiet peace streets of London's sleepy suburbs become lanes of terror. Indeed I am wondering how much it will take to break that iron will of yours, and change the famous detective into a babbling baby."

CHAPTER XI

Jolsen's Power.

THE voice ceased, and Jolsen's fingers began to wander over the mass of controls, pressing one here and turning another one elsewhere. Watching closely were the eyes of the detective. Contact after contact flashed in and out of circuit on the mighty switch-board in answer to the movements of the man's fingers. Each was followed by the lighting up of the individual reflector plates in front of the two men. Riel, noticing that the other was now controlling the scene with one red dial, turned his attention to the vision before him.

The clear life size scene that Jolsen had already trained his ray on, was indeed quiet and peaceful. Children played in the streets and on the door steps, tossing balls and skipping over ropes, while others crowded around the organ grinder's monkey as it sought pennies or peanuts from its audience. A few old fashioned motor cars stood by the curb or moved slowly down the street. Many woman sat around the doorsteps chatting with one another and enjoying the warm afternoon air, while numerous dogs lay curled up in shady places or raced around with the children at their play.

Although he watched the scene before him, the detective's mind was elsewhere. He was desperately trying to plan a move by which he could destroy the infernal apparatus and get the wizard into his power. Such a move, he knew, would have to be made carefully and quickly for he well realized that one slip would be fatal. He would never get another chance. The fingers of Jolsen's right hand moved and were poised now over a group of push controls, while his left hand slipped the mask down over his face to enable him to get closer view of the scene before him.

"Now, Riel, we'll make our first real test of the Mentoray. That's the name I have given to the new telepathy ray to distinguish it from the other type, which is the same ray with the exception that the Mentoray is effective against animals and harmless to man, while the other ray works in the opposite manner. In both cases the same ray is used but different pulsations are used on each, and many changes have to be made in the controlling apparatus."

As he spoke, one finger pressed a small white button, and a series of electro-magnets on the control board threw contacting devices into circuit or released them, while similar disturbances took place on two of the control panels on the wall. The deadly ray was on.

Unable to resist, Riel gazed at the scene before him. In what way could the ray disturb that peaceful scene? Was the master mind merely playing with him, or was—? A dog rose from its nap and commenced to roam around restlessly; another followed, awakening

suddenly from its dozing. The dial under the man's hand moved another thirty degrees. A scream sounded in the ear units as a dog made a snap at a little girl's leg. The next moment, the street was a wild scene of terror. The score of dogs had become as savage wolves, and with bared teeth were attacking and biting the children right and left. Mothers ran screaming into the street to be met by mad dogs, for the now savage beasts sprang at the nearest human without a moment's hesitation, sinking their teeth deep into the flesh, tearing and mangling their victims horribly.

Riel could stand it no longer, and with an oath sprang at the villain beside him, but scarcely had he left his chair when he fell back, his muscles paralyzed and useless. But the moment he dropped back into his seat the paralyzing grip left him as rapidly and as mysteriously as it had come.

With a move of a finger, Jolsen switched off the Mentoray, leaving the vision beam on, and turned to his companion.

"It is well that I had the paralyzer ray adjusted so as to be trained on you while you are at the table here. I see, I must prevent you from trying to interfere with my work. However, you will not be bothered with it unless you yourself switch it on in attempting to leave your seat."

Again the master mind was back at his controls, gazing intently into the reflector plate before him. Reluctantly, the detective decided that he could do no harm in witnessing the scenes and, hoping to find a way by which he could yet prevent the devilish intentions of the other from being put into effect any further, put on his head mask and turned again to the reflector plate in front of him. Jolsen had already shifted the scene, and the view now displayed a view of the tropical jungles.

"I am curious to see the effects of the ray on the jungles of Africa," the same tantalizing voice of the scientist came to the ears of the sleuth. "It will no doubt be surprising to see the power of the jungle, when all its inhabitants unite in one sweeping drive against man. I have put the pulsations of most of the native animals of Africa on one recording cylinder which I am now preparing to put on the ray. I will use the fan beam this time instead of the narrow needle beam until I locate our next victims. The fan beam will spread the ray over a large area of country at once. However we will cut down again to the needle beam before we apply the Mentoray."

As he was speaking, Jolsen kept the vision ray roving over the endless jungles searching for a desirable location to create his next bloody massacre. Swinging the ray back and forth across the large areas of thick tangling brush and sweeping the clearings with a twist of a finger and plunging into more thick undergrowth, he carefully watched and controlled the scenes as they swept before his eyes.

"Ah, here we are," he exclaimed with satisfaction, as he detected a hunting expedition trailing through the thick growth of trees. "These people are out searching for big game. We shall provide them with plenty."

The beam was soon adjusted to show the party up clearly on the visoplate. It consisted of about forty natives and two white men, trailing slowly through a dense part of the jungle in single file. The majority of the natives were carrying the supplies and equipment of the expedition, with which they were well loaded, forcing the party to travel slowly.

Again the white-topped button moved beneath the fingers of the master mind, and once more the deadly Mentoray was following the vision ray. Almost instantly the party was attacked by a group of monkeys and a lively battle commenced. A giant boa snake struck at one of the natives from the thick growth beside the trail only to receive a bullet between the eyes from one of the white members close by. The members of the party soon gathered into a group, and under the leadership of the two whites were battling the ever increasing hordes of creatures that were attacking them now from all quarters. Suddenly from among the trees flashed the lean, striped body of a tiger, which, with a savage snarl, leaped into the little group slashing and tearing as terror-stricken natives fled in all directions. Another and another entered the scene and took part in the massacre, pouncing on the fleeing natives and tearing them down. Escape was impossible. Man was hated by every animal of the jungles. The mighty boa snake with its bone crushing coils was searching for a human victim, the savage man-eating tigers for miles around were recklessly roaming the trackless jungle growths trying to locate the scent of their human foes; while gorillas and swarms of monkeys and apes were patrolling the thick brush, their brains directing them to look for a man, and to tear him and kill him with all the pent up rage they could master.

Riel took his eyes from the plate. He had seen many nerve shattering scenes before during his adventuresome career, but never anything equal to this. Again he looked at the plate, but not a human remained standing. No sign of the expedition remained with the exception of a few torn mangled bodies, some of which were already satisfying the appetites of the man-eating species of the jungle. The two white leaders of the party were nowhere to be seen, their lifeless bodies were no doubt being carried through the thick jungle growth to the lair of some jungle king.

With a clicking of relays on the control board, Jolsen shut off the two rays and removed his head mask.

"Well, Riel, you will now have to admit that I am master of the planet, or in other words ruler of the earth. I have given you these demonstrations of my power and ability to control the earth, just to prove to you that no man or beast on the surface of this globe can stand against me. I have shown you, beyond a doubt, my ability to carry out my word, so that you will see the uselessness of trying to fight against me. By this time you can surely see that the best way for you to help your fellow men, is to advise them to submit and accept me as the ruler of the earth. I am prepared to let you return home under condition that you do this, but if you make one false move I will not kill you instantly, but I will turn the ray on the world and force the masses into submission in my own way."

What Hope?

"SAVE your words," Riel replied calmly but firmly, "I am here for the purpose of crushing you at the first opportunity, and that is what I am going to do. Your ray is powerful no doubt, but is not sufficient to drive man off the earth. There are insufficient animals in the large cities to overpower the citizens."

"But I am using but a fraction of my power, my dear Riel. If I were to cause the mighty skyscrapers of your cities to come crashing down, adding the terror of fire, death, starvation and lack of water to the problems of

city dwellers, there would be no city left to live in. Also, I might say that the most deadly feature of my ray has not been explained to you yet. Look at that large black cylinder there suspended from the ceiling over the chemical bench. Do you know what that is for?"

"Undoubtedly another series of animals can be controlled by it."

"Wrong again, Riel. Really you give me very little credit at all. That cylinder contains the brain impulses of—well guess."

"If you would only use your infernal apparatus for the benefit of the world, you would get all the honors, riches and respect that you could stand. Why, man, think of the good that you could do with that ray. You could completely free the world of all undesirable animals and make other ones work for the benefit of man."

"I'm afraid I'll have to tell you," continued the master mind. "That cylinder contains brain impulses of the entire insect world."

"Good Good, have you any more such inventions?"

"I won't need any more, my dear friend; in fact I am sure that I could get along nicely without this last one. But in case the animal kingdom cannot overpower the human race sufficiently to drive it to submission, I will have to call out the insect armies for help. And, as you are well aware, there are millions of insects to every man and no effective way of fighting them. It is easy to see the results. The combined insect and animal world will be powerful enough to have this planet uninhabited within twenty-four hours, except for the few that may find temporary protection. So think over what I have just said. I am going to prepare the ray now for another demonstration, but a real one this time: for every animal, domestic or wild, within a range of a thousand miles of me in all directions will rise against their masters when the ray is again turned on. It will be best that you agree with my terms, and save your fellow inhabitants the embarrassment of being chased along the city streets by dogs, horses, cats, rats, mice and what not with scores of birds savagely darting down from above pecking holes in one's skin at every step. Then, if he survives that, we will add the other cylinder to the ray and see him stung and picked to the bones by the swarms of insects that are ready to serve me. I have already prepared a message stating my demands to the world, and I am now going to switch it onto the automatic repeater which will broadcast it to the entire world. I want all nations to know about me and my intentions before I turn on the ray, for they will then be quick to recognize my power and ability at the first touch of the ray. I will continue to send out my warnings and orders, while I back them up with demonstrations of my power until body after body and nation after nation submits to my terms."

As he talked, the old scientist commenced more preparations of the controls of the large switch-board, changing adjustments, interchanging coils and resistant units and connecting up additional sections and panels mounted on both the main board and the row of panels above the electrical bench.

"There," he exclaimed, with a chuckle, screwing a copper jumper into place across two panels, "the automatic radio repeater is now sending my message to the world. Now I'll place two more Colbert tubes in the projector cabinet, that will strengthen the ray sufficiently. Well, Riel, have you decided to accept my proposition?"

"I'll see you roasted first," was the brief but snappy reply.

For a moment the smile died on the face of the old man and his eyes narrowed, reflecting the hatred that lurked in the heart, but he instantly recovered his former poise, with the exception of the mocking smile.

"At times I am tempted to finish you on the spot, Riel, but I will control my temper. You are safe in my power so there is no need for haste. After you see the effects of the ray this time you will be more than willing to become my spokesman to the world. Now suppose you resume your seat at the table, and we'll try out the ray again, this time in wholesale manner, and give the world a taste of my power to hasten their decision."

"I prefer to remain away from the table."

"It grieves me to say so, Riel, but I insist that you take your place in your chair. I feel safer, because any attempt by you to leave it will turn on the paralyzer ray. So if you insist upon staying away from the table, I will be forced to turn the ray on you where you are, to be sure that you will be unable to make any attempt against me."

Without further words, the detective took his place at the table, and the old man switched on a group of three buttons. Riel suddenly leaping up from his chair, was forced back as the paralyzer ray gripped him. But he had found out what he wanted to find out. One of those switches controlled the paralyzer ray, and they were all within reach of his arm.

"You seem very forgetful, Riel, but you must remember that you are to keep your seat if you don't want the ray turned on you."

As the Wizard adjusted the table controls before him, the detective tried desperately to think of a way to wreck the apparatus. He could possibly reach out and open the three switches without leaving his seat and turning on the paralyzer ray, but the moment that he attacked his adversary, a screech from the old man would cause the ray to be turned on again, against which Jolsen was no doubt protected. No, he must act carefully and surely this time, for another failure would probably cost him his life and leave the rest of the world at the mercy of the master mind.

Jolsen snapped off one of the three switches, and went to the main switch-board. After making some minor adjustments he returned to his seat, snapping the switch back into circuit. He commenced to turn a dial that caused the scene to shift on the reflector plate. The detective was quick to notice this and decided that the switch was for the mechanism that rotated the ray projector, and that it was controlled by the dial under the man's hand. There would now be only two switches to throw open if he saw an opportunity to overpower his foe. So with hopes rising in his heart, the sleuth adjusted his mask and pretended to take a great interest in the scene on the reflector plate before him.

A Desperate Chance

A GREAT expanse of the American coast was visible in the view before them, and it was evident that the wizard intended to not only cover that vast area with the vision beam, but also to use the Mentoray over the same area. No part of the scene was large enough to be seen plainly in the reflector plates on the table, the complete view appearing as if the observer were

far above the land and looking down on it, enabling him to see a vast expanse of territory at once, but not allowing a good view of any one section. As he looked over the view before him, Riel's mind was busy trying to work out a safe and sure method of turning the tables on the man beside him before he turned the rays on again. Suddenly the scenes in the plates grew dim, and Jolsen switched off one of the other two switches, causing the scene to go blank immediately. With a beating heart the detective noticed that. He now knew what each of the three switches controlled. The one that had been turned off, causing the light of the reflector plates to go out, undoubtedly controlled the vision tubes, and the other, the paralyzer ray that he would have to turn off before he could hope to make any successful attempt against old Jolsen.

"This is a fortunate time for a vision tube to burn out," commented the wizard as he rose from his seat and walked over to the chemical bench and unwrapped a large tube, "It is better to be interrupted before we get started than to have to replace a tube at the cost of interrupting an interesting scene when things are active."

Stepping to the main switch-board, he commenced to slide out a drawer that formed part of one of the panels from the front. Watching, the detective gave a start. The giant tube that Jolsen held in his hand was a Colbert X.C. tube. At this discovery, the sleuth was fully alert. He glanced cautiously over at the switch-board as the old man drew out the section of the control panel fronting. A savage thrill of joy ran through Riel, as he saw six of the mighty Colbert X. C. tubes standing in their base unshielded. As the master mind looked them over and commenced to remove the defective one, Riel carefully calculated the distance between himself and the two switches. The sweat began to form on his brow as he realized what the move meant to him and the world at large. It would be his one and only chance. He gazed at the heat ray projecting machine standing on its own independant table a few feet away from him, and noticed with satisfaction a large main switch on the device that indicated that it was open, he also noticed a small light burning for some unknown reason on the front of the controlling panel of the heat ray device. It was sufficient proof that the power was on the machine and that the throwing of the switch was all that was needed to start the device operating. Again he looked at Jolsen. He had now unclamped the old tube and was looking over the new one. With set face the detective measured mentally, the distance between himself and the heat ray machine.

Could he make it? The question burned itself into his brain. Would the heat ray operate at the throwing of the switch? Were the tubes in front of the old man genuine X.C.'s or were they some other make of similar appearance? Could he reach the heat ray machine before old Jolsen would collect his senses enough to let loose a screech that would operate some device and turn the paralyzer ray on? The wizard was setting the new tube in its place beside the others. Riel breathed a silent prayer and leaned toward the switches, as he picked out the two that he would have to throw. He would wait until Jolsen clamped the new tube in place. Clamp, clamp, Riel heard the vision tubes clamps snap and knew that if he was to act, the time was now. With lightning speed he leaned over in his seat. He must throw the vision ray switch in before he threw the paralyzer ray switch out. Snap, the vision beam switch clicked into place. A startled look overcame the features of the wizard as he made a quick attempt to shield his eyes, but too late, the battery of Colbert tubes lit up directly under his eyes, their blinding rays ruining forever the sight of the master mind. Even as the vivid light of the unshielded tubes lit up the room, the fingers of the detective leaped to the other switch, and throwing it out leaped from the chair toward the heat ray machine. A shrill cry of mingled agony and hate leaped from the wizard's tortured face and Riel felt his limbs buckle under him. With a last desperate lunge he hurled himself against the heat ray device as he fell. His arm struck against the switch, releasing the spring trigger allowing it to spring into circuit, and at the same time striking the delicately balanced cane or projector on the top sending it careening around on its pivot. The next moment the detective lay powerless at the base of the instrument unable to move a limb.

As he dropped, a streak of red fire leaped from the double pointer of the spinning heat ray projector and striking the walls of the room about five feet above the floor, cut a fiery ring about the room which grew deeper at every revolution of the pointer. A cry of added pain leaped from the painful and distorted face of Jolsen as the fire ray cut his countenance a dozen times before he dropped to the floor. The walls of the room were soon ablaze as the fire ray continued its mad sweep around. Electrical wires soon shorted and burned in two; chemicals caught on fire turning that portion of the room into a roaring inferno. The smoke was becoming unbearable, and the helpless detective and tortured huddled bulk of the master mind were soon enveloped completely in the thick poisonous atmosphere, as the fire grew fiercer, fed and coaxed on by the relentless streaks of fire from the heat ray instrument.

Riel saw with horror, the increasing flames spreading swiftly through the room, and tried desperately to move himself sufficiently to shield his face from the burning heat and choking smoke. But he was powerless, doomed to die like a rat in a cage without a chance of saving himself. A savage smile came to his lips as he saw the wizard squirming on the floor near the blazing wall. He felt a great satisfaction in death at having first brought his antagonist down. Thicker and thicker grew the smoke, while the heat from the blazing walls and equipment became almost unbearable. The lights of the room went out as more electrical wiring and control panels gave way before the savage onslaughter of the ray. Panels and heavy electrical breakers and contactors crashed to the floor in turn, but the paralyzer ray kept its merciless grip on the detective. Suddenly the fire ray ceased as the control panels of its equipment gave way, but still the two men lay on the floor as the room became a furnace. Powerless to help, Riel saw the flames creep up around the now unconscious master mind and his clothing begin to burn. Then another sight made the detective's blood run cold; with horror he saw the mighty switch board sway on its supports, as it towered high above the prostrate form of its master, he tried desperately to break the grip that was holding him, to drag the unfortunate man out from under the massive board before it fell. But it was useless; he was unable to move a limb. More and more the great mass of marble and copper leaned forward until with a cracking of its supports, it fell forward. The detective shuddered and for a moment closed his eyes, opening them a moment

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The Space Visitors

By Edmond Hamilton

The colossal scoop had descended lightning-like out of the skies at dusk and with incredible quickness had cut a vast hole of destruction through the city. It glittered strangely as though composed of an unknown metal.

JUST as we look upon fish as inhabitants of the ocean, so some beings from outer space may look upon us as being inhabitants at the bottom of an atmospheric ocean.

Such beings, possibly gigantic in size and power, coming in the vicinity of our earth, may, for purposes of curiosity or exploration, decide to discover what we queer beings are, and what this little planet is that we inhabit.

That such beings may have actually come near the earth, is asserted forcibly by Charles Fort in his amazing book, "The Book of the Damned," in which he brings forward evidence to show that over a period of the past 150 years there has been evidence of strange extra-terrestrial activity, presumably from sentient beings.

As Mr. Hamilton so truthfully points out, we beings of the earth are not at all isolated. Any day we may have plunged upon us an enemy from space that would have no more regard for our civilization than we have for those of the ants and other insects.

How we may combat such enemies, Mr. Hamilton shows in quite a remarkable story.

EDMOND HAMILTON

BECAUSE Dr. Howard has asked me to prepare a concise account of the coming of the space-visitors, I, Stanley Ransome, have tried to write a simple record of my own contacts with them. Such a record will necessarily have errors enough; but it seems to me that the facts can be most clearly presented in such a fashion.

It was late in June that I first learned of the affair, through Dr. Howard himself. Dr. Jason Howard was holder of the chair of Aeronautical Science in Gotham University, and his contributions to the progress of aerial navigation had made him renowned in both scientific and commercial circles. For two years I had been an instructor and assistant in his department of the university.

Toward the end of that particular June afternoon he came into the laboratory where I was testing the tensile strength of a new alloy, and handed me a folded newspaper.

"You haven't seen this, Ransome?" he questioned. "They're shouting them all over the city."

"I hope you haven't ruined a completely good test to call my attention to the latest murder," I jested, as I unfolded the paper. But when my eyes took in the import of its black headlines my smile vanished. They shrieked their message in the tallest available type:

HUNDREDS SLAIN IN IOWA VILLAGE BY CATACLYSM! MANNLERTOWN SCENE OF MYSTERIOUS HORROR!

The story below the headlines described what was then known of the catastrophe which had occurred just before dawn on that day. Mannlertown, an agricultural center of considerable size in eastern Iowa, had been awakened a short hour before daylight by a colossal grinding and roaring sound coming from the east.

Before the startled, half-awakened people had been able to leap from their beds, however, the thing was upon them. It was horror, earthquake, annihilation, all in one, driving across the town with immense speed. A terrific crashing of shattered buildings spread through the community, and for an instant the gigantic grinding roar seemed receding westward. Then it had stopped completely.

It was several minutes before anyone in the stunned city ventured out into the streets, half-curious and half-terrified. But those who finally did so were paralyzed by astonishment and terror. For a colossal path of destruction had been cut straight across the city's northern section.

It was like a gigantic trench or canal gouged out by a superhuman instrument, being over a quarter of a mile in width and almost as great in depth. It began in an open field three miles east of Mannlertown and ended in a thinly-settled suburban section a mile westward.

Houses, people, trees, fences, roads—everything that had lain in the track of the unknown destroyer had vanished as though it had been whirled into space, and there lay open to the sun nothing but this vast wound in the earth's surface! Hundreds of people, it was estimated, had gone to death in the moment of the unparalleled cataclysm.

Doubt

IT is not surprising that panic sent the people of Mannlertown fleeing in all directions before the coming of the day. The newspaper stated that federal and state authorities had taken every precaution to calm them, and already many who had fled were returning to the stricken town, it being apparent that no further disturbance was taking place.

But what had caused this one? Was it an earthquake or a volcanic action of some unheard of nature? No answer could be definitely made, but the geologists and other scientists consulted regarding the thing were in general agreement. It could only have been caused, they stated, by some giant meteor that had grazed the earth's surface and gouged this great scar across it in passing. More could be learned from examination of the cut but it was certain that a meteor was the cause.

When I had finished reading I looked up at Dr. Howard, sobered by the horror of what I had just read.

"A terrible thing, surely," I said, and he nodded somberly.

"Just how terrible, is not yet realized," he commented

"Why, you don't doubt that it was a meteor's work, do you?" I asked. "That great gouge—"

He shook his head. "Who can say? But if a meteor of giant size did it, where is the meteor? They do not as a rule, graze earth and then vanish, Ransome."

"Maybe not," I said doubtfully, "but in this case the scientists all seem pretty sure. And after all, what other explanation for the thing is there?"

To that he did not answer, though I could see that he was unconvinced. So I was not surprised when Dr. Howard left for Mannlertown that night by a fast Chicago rocket express. To me, as to others, he said only that he wished to make a brief examination of the scene of the disaster with certain ideas of his own in mind. I knew without his telling, though, that his doubts persisted.

The world at large did not share those doubts. There was wide-spread horror over the Mannlertown catastrophe, but it was the rather abstract horror aroused by some unprecedented accident of which the very strangeness somehow dulls the edge of reality. And none seemed to doubt the dictum of the scientists concerning the gigantic missile from space that had shot into the earth's atmosphere grazing its surface and then shooting out again. I know that, despite Dr. Howard's attitude, I myself did not doubt it.

Dr. Howard returned from Mannlertown two days later. The only information that he imparted was that his investigations had proved satisfactory. He said nothing more and, assuming that his inspection had disproved his doubts, I forbore mentioning the thing to him. It was not until the second cataclysm, a day later, that I learned along with the rest of the world, what his thoughts on the matter were.

This second cataclysm took place on the afternoon of July first, but, because of the remoteness of its scene, word of it did not reach most of the world until the next day. For the scene of the second event was those bleak Finnish plains that lie east of the Baltic, and particularly one barren valley far from the nearest telegraph.

News concerning what had happened was scanty enough. The central fact was that upon one of that valley's slopes, something had gouged from the grassy earth a tremendous trench like the one that had been cut through Mannlertown. It was of the same general size—several miles in length and a quarter-mile in depth and width; but in that remote place it had done almost no damage to life or property.

The only damage to property, in fact, had been the destruction of a herder's hut that had been in the path of the thing. The seven herders who had occupied it luckily for them, had been tending their flocks on the slope of a neighboring valley. All had heard a gigantic roaring and grinding sound, and had run up to the dividing ridge as the sound ceased, to be confronted by the great gouge below. One of them, however, had been on the ridge at the time and told an excited and almost incomprehensible tale regarding it.

He said he had been gazing down over the slope in question when the disaster had happened. First came a great flash of light in the air above, the flash of some colossal glittering body swooping from above to earth's surface. He could not describe what he claimed to have seen of it in that lightning-like glimpse, and could describe it only as of something huge and glittering, and roughly scoop-like in shape.

In the very second that he saw it, it had struck the slope, and then with great speed had rushed forward, along it, half-burying itself in the earth, emitting a loud, grinding roar. In an instant it had streaked like light along the slope for several miles and then with an upward flash was gone, the noise gradually ceasing.

This tale, even doubted by the man's companions, certainly received small credit from the outside world. The paper that I read mentioned the story only as an illusion, born of excitement, and went on to point out that while the Mannlertown cataclysm had been repeated the explanation accepted for it had not been disproved. It simply meant that another giant meteor had grazed our globe, and it might well be that the earth was passing through a swarm of them.

I will own, however, that to me the meteor explanation seemed rather weakened by this so exact repetition of the first catastrophe, and I could not see how this recurring catastrophe could be explained so simply.

Howard's Theory

AT the first news of the thing, I had sought Dr. Howard to learn his own views of it, but he was not to be found at the university. And by the time I had met him the next day I, along with most of the world, had read the late editions of the newspaper in which he first startled the nations with his astounding explanation of the two cataclysms.

He stated that he had studied closely the scene of the first cataclysm, and had derived therefrom a theory as to its cause which he believed was substantiated by the second occurrence.

"No one who has considered carefully the Mannlertown catastrophe," he stated, "can credit for a moment the idea that it was caused by a meteor. Had a great meteor actually grazed the earth that night, the sky for a thousand miles would have flamed with its passing, even had it been able to pass out of earth's grip after entering it, which is an incredible hypothesis.

"The cataclysm at Mannlertown was not caused by a meteor, but by some vast scoop-like object that was drawn across several miles of the earth's surface with immense speed and in that way gouged out the great trench in the earth. This second cataclysm in Finland was obviously caused in the same way, there being no appearance of a meteor in the sky. The huge scoop of which I speak was actually seen in the second case by the Finnish herder whose story has been little credited. But the very wildness of which is almost a guarantee of its truth, especially coming from such an unimaginative person.

"We must accept, then, the theory that on two different occasions within the last few days a giant scoop of some sort has been lowered from outer space, dragged across the earth's surface for several miles with incredible speed, and then jerked upward again, taking with it the matter it has cut from the earth! Just as we men sail over the surface of our waters and let down trawls to drag along their beds far below, so someone, something or things, exist on the surface of the atmospheric ocean at the bottom of which we live, and is letting down trawls to drag its bottom, the surface of the earth.

"This idea may seem fantastic to many. We human beings do not think of ourselves as living at the bottom of an ocean; but a little reflection will show that

to be the case. The atmosphere is an ocean, fifty to sixty miles in depth, covering all the earth. Our knowledge of it indicates that, becoming more and more rarefied, it has a fairly definite surface or limit a few score miles above us, beyond which lies empty space.

"So there is a great air-ocean, and at its bottom we live. The pressure at its bottom is tremendous, even as the ocean's pressure is tremendous near its bottom. But like the creatures that live far down in the sea's depths, we are so habituated to that pressure, and our bodies braced internally against it, that we do not feel it. If we were to be taken into empty space our bodies would explode as would fish taken from the sea's depths. And in the same way, were creatures accustomed to empty space to enter our atmospheric ocean they would undoubtedly be crushed to death by its pressure.

"It is that which in my opinion, accounts for this trawling from above. It may be that for centuries, while we have pondered on the planets and stars, ships from those planets and stars have been coming and going far above us, filled with creatures who have evolved in space as we have evolved in air and fish have evolved in water. We would know no more, dream no more, of the existence of those space-ships than the creatures at the seas' bottoms know of the great liners going and coming far above them.

"But suppose some of these beings, possessing space ships, become curious as to what lies at the bottom of this air-ocean of ours. They could not venture down into it. What would they do? Would they not let their ships cruise to and fro on the surface of the air-ocean, and let down great trawls to drag the bottom far below, just as we men trawl an ocean into whose depths we dare not descend.

"I believe that is what is now going on. Far above us, at the surface of our atmospheric ocean, there are cruising ships or a ship, which we cannot see, holding beings from some great planet of whose nature we dare not guess. They cannot descend into our atmosphere but they are letting down their great trawl from above to drag the bottom, which is earth's surface, to see what lies upon it!"

"And make no mistake! These beings, who may be infinitely beyond us in intelligence and science, and who are undoubtedly completely different from us in every respect, care naught for the wreck and ruin they may be causing with their trawls. Any terror they might loose upon us would mean nothing to them. For to them, high above, we at the air-ocean's bottom are no more than the blind, strange creatures that we fish from our own watery seas' depths are to us.

It seems unnecessary to describe the turmoil that was aroused by this startling statement of Dr. Howard's. It is hard to expose the wilful blindness of a world that now looks back upon that blindness with something like terror.

Dr. Howard's theory became the target of every form and degree of criticism during the ensuing days. His idea was susceptible to ridicule, and the scientists whose meteor-theory he had questioned seized the opportunity. *Did* we live at the bottom of an ocean, an atmospheric sea? *Were* we merely crawling things upon earth's surface, to be fished for and examined curiously by unimaginable beings and vessels far above? The idea was too humorous. The public's indignation dissolved into laughter.

The Third

AVERY conceivable fact was brought forward to demolish the "ridiculous" theory. If space-ships were passing to and fro constantly outside our atmosphere, why had they never been glimpsed by astronomers? Dr. Howard replied promptly to this by giving a list of unknown objects sighted by astronomers in space in the last decades, by Sporer and Wartman and Grek and Ferguson and Loomis, and scores upon scores of others, objects seen against the sun or moon or planets. and which had never been identified.

There was no more criticism on that score, but a side-issue was raised. Dr. Howard had stated that the atmospheric sea of earth had in all probability a surface as definite as that of an ocean. Many attacked this minor point, but were met by Dr. Howard with the cold data of many tests, showing that while for a certain distance the air becomes rarer with increased altitude, it seems thereafter to remain constant, indicating that from that point up to its definite end or surface its density is the same. There was no valid reason why an ocean of air should not have as definite a surface as an ocean of water.

Each new critical attack brought forward in those few days met with much the same treatment and the criticism on the part of Dr. Howard's enemies began to change into bad temper and abuse.

I mentioned this to him on the night of July 5th, showing him an account of the latest attack. From my first reading of his hypothesis, it had seemed to me crystal-clear in truth, but conventional scientists had found its startling presumptions upsetting.

"They wouldn't believe it, some of them, if they themselves were picked up by a trawl from above and whirled around the earth," I said.

He shook his head thoughtfully. "I think that they will believe it soon, Ransome," he said. "If these visitations from above continue—"

"You think they will continue?" I asked. "After all, why should they? If beings out of space actually are trawling, they must have learned enough from their two attempts to satisfy them about earth's surface."

"I don't think so. For all we know, Ransome, they may be searching for minerals or ores or materials unknown to us, hoping to drag them up from the bottom of this air-ocean. Or they may want living things, for purposes of their own. Or it may be mere scientific curiosity. God knows what motives sway them, but let us hope for one thing."

"And that—?"

"That they do not find whatever they are searching for. For if they do; if they come to look on earth as a source of needed materials. it means the end of our civilization. Imagine those gigantic trawls descending in great numbers out of the skies day and night to gouge earth's surface—imagine perhaps great air-submarines or hermetically closed ships of some kind venturing down here to the surface—or submarine mines, caissons of some strange sort here at the bottom of the atmospheric ocean—creatures of dread—"

I shook myself clear of the horrors his words suggested. "After all," I reminded him, "this is a rather baseless fear. There haven't been any more cataclysms and it may well be that—"

Abruptly I halted. Through the open windows of the apartment came the growing clamor of shouting voices. We ran to the window and at the sight of the excited newsboys along the street I think that the same foreboding gripped us both. Three minutes later we were looking together at one of the newspaper extras, reading it in a horror-dazed silence.

Only a few hours before, the terror from above had struck earth for the third time, and this time with

the most terrible results thus far. For the victim had been Chicago! The colossal scoop which the excited Finn had attempted to describe had descended lightning-like out of the skies at dusk, and with incredible swiftness had cut a vast lane of destruction through the city.

The giant thing had been seen more or less clearly by many thousands, despite the swiftness of its action. It was colossal in size, much like a steam-shovel's scoop in shape, glittering strangely, as though composed of an unknown metal. Its top disappeared far above into the night.

The thing had struck the city's southern acres and in a moment, with a roar as of worlds splitting apart, had cut northward across the city and for a mile or more out into the lake, then flashing up into the dusk as swiftly as it had descended. Chicago was in uncontrollable panic, Chaos of unnameable fear, and troops were on their way to quell the lawless rioting and looting that had already begun.

When we read that, both Dr. Howard and I were silent for some time, listening to the disturbed hum and roar of excitement that penetrated the room from outside. And before either of us could speak, we were sharply aroused by the coming of a telegram. Dr. Howard read the brief message twice, then handed it to me, without comment.

An hour later saw us in a great army plane flying southward through the night toward Washington.

A Conference

IT was still night when our plane slanted out of the darkness into the blazing landing-field lights. A powerful car awaited us, and as it sped with reckless speed across the city which was as aroused, excited, and horror-stricken as New York, we could distinguish now and then the great dome of the Capitol, gleaming white in the light of dawn.

In a short time we were inside the Capitol, and were ushered into a small panelled room where a dozen or more men seated around a table awaited us.

I recognized at once the strong face of President Rogers, at the table's end, and perceived, also, the well-known features of the Secretaries of War and of the Navy. Beside them were the ambassadors of Great Britain, Germany, France, and a half-dozen other great powers, while secretaries and aides hovered in the background. It was the group, representative of the world's governments, that the President had gathered together at once after the Chicago cataclysm, and he had summoned Dr. Howard to meet with it.

He greeted my superior and myself courteously; but the strain that he was under showed as clearly in his face, as it did in the others about the table. At once he plunged toward the point.

"Dr. Howard, some days ago you gave to the press a suggested explanation of the Mannlertown and Finland cataclysms which was, despite your scientific eminence, too startling to be accepted by the world or by your fellow-scientists. That explanation has now been shown by this catastrophe that has riven Chicago to have been irrefutably true. We must accept, unprecedented as the situation is, the fact that vessels of some sort from outer space are actually trawling the earth's surface from above its atmosphere, that trawl having been seen at Chicago by thousands, as it was seen in Finland. You alone among scientists have comprehended the nature of this menace. We have called you here to suggest some method of meeting it."

Dr. Howard was silent and thoughtful for a moment, gazing from one to another of the anxious faces at the table, then the President spoke again.

"You must be well aware of what the result of continued catastrophes of this sort will be. Already the wildest panic has gripped the section around Chicago, and the rest of the country. The whole world in fact is trembling upon the brink of a similar panic. The very uncertainty of these disasters encourages panic. None can say that the next blow will not be in his city and cut away his home and his life. All are aware now that your theory is correct, and that adds to the horror. For if a vessel or vessels with alien beings of some sort in it actually hover far above, none can say what greater horrors it may still loose upon us. We must strike back in some way, must drive these beings, whatever their nature, from the earth. Would there be any chance of doing so with dirigibles or planes, in your opinion?"

"Not a chance, sir," Dr. Howard replied at once. "The rarity of the atmosphere at its surface makes even an attempt impossible, for no ship of ours could ever reach the surface of the atmosphere."

"But what are we to do? Is there no method by which we can combat this menace? Must we lie supine and let whatever cataclysmic terror they choose descend on us?"

All eyes were upon Dr. Howard as he gravely answered. "Since I first comprehended what lay behind these catastrophes I have sought for some method of halting them, some method of striking back at whatever ship or ships from space are hovering over us. To find such a method I have had recourse to the same analogy that has been made so terribly clear to us, the analogy between ourselves at the bottom of our air-ocean and the creatures at the sea's bottom.

"Suppose those creatures far within the sea's depths had some intelligence and science, and suppose they wished to halt the trawling of our ships whose great scoops sweep down now and again upon them. How could they do so? They could not venture up to the ocean's surface. But one thing they could do, and that would be to send up something that would fight for them, that would make it impossible for the trawling ships to cruise longer on the surface!

"They could, granted science and intelligence enough, construct great mines in vast numbers. These, if attached to air-filled globes, would be swept instantly up to the ocean's surface when released. They would float there indefinitely, and any ships cruising to and fro would sooner or later strike one and be destroyed, unless they were warned by the previous destruction of one. In this way the creatures of the sea's depths could prevent our cruising above and trawling for them.

"And this is the way we must use to fight the beings who now cruise far above us! We must mine the air! We must send up thousands of great mines constructed so that they will float up to the surface of earth's atmospheric ocean and remain near that surface where, we know, the ships of these space-beings are coming and going. With thousands of mines floating about some of the invaders will inevitably be destroyed by a collision with one of them.

The others were silent for a moment. Then the Secretary of War broke out:

"Mine the air!" he repeated incredulously. "But how? How could any mine be constructed to float up in that way, so light as to float on the atmosphere's surface?"

By Means of *Steelite*

"THERE we have recourse again to our analogy," Dr. Howard declared. "If a mine attached to a great hollow globe of air were released at the sea's bottom it would rush up toward the surface and float there. In the same way, a mine attached to a great globe in which is a complete vacuum would rush up through our air-ocean!

"We can construct those globes of the strongest and lightest material known—*steelite*. As you all know, *steelite* is the recently devised metal that has immensely greater strength than steel but the merest fraction of its weight. The tensile strength of a substance, its hardness and other qualities, depend directly upon the arrangement of its molecules. By the recent discoveries of Browning we know that when steelite is synthetically made the arrangement of the molecules is such that it forms an extremely strong and rigid substance. This gives the material unheard-of strength with unheard-of lightness.

"A forty-foot globe of *steelite* can be made, with a charge of explosives of terrific power attached to it that will detonate when the globe is touched. This done, all air is exhausted from the hollow globe by great pumps, until the vacuum inside it is almost complete. The enormous strength of the steelite shell prevents its being crushed by the atmosphere's pressure as an ordinary steel shell would be.

"Released, the vacuum globe with its deadly charge will shoot up through the atmosphere with terrific speed. Its lightness for its size will be such that it will not halt until it floats on the very surface of our atmosphere. We will make these globes in countless thousands, each with its charge, and release them. Each globe will have a device that will repel any other, so that they do not detonate each other. We will sow the surface of our atmosphere with these deadly air-mines! Sooner or later the ship or ships cruising to and fro on our atmosphere's surface will strike one and will be destroyed by its detonating charge. In this way, and only in this way, can we fight back against the beings from space who are releasing this horror on us!"

"But to make these globes or mines in such numbers will engross all the earth's industrial activities!" the British ambassador exclaimed.

"It will," Dr. Howard agreed quietly. "But what of it?" Have you not yet realized that a world crisis is upon us? Have you not yet realized that in this case there is no question of countries or races, of profits or dividends, or expediencies, but that we, as men, are fighting for the existence of man? That we are fighting against beings who may be immeasurably more advanced in knowledge and power than ourselves?"

"Dr. Howard is right," said the President. "Gentlemen, this emergency must be clear to you all, and I think that it is equally clear that Dr. Howard's plan is the only one that affords any possibility of combatting this terror from above. I place all the resources of the United States of America at your command, Dr. Howard, and I know that when the representatives of the other nations here have reported to their governments they will do the same. The whole world's efforts must concentrate upon the prevention of these terrible disorders."

"There is but one thing earth's peoples can do," Dr. Howard said. "Make air-mines! Thousands, tens of thousands—they must be turned out in ceaseless floods and released. For it is only with them that we can repel the menace above us."

Make air-mines! It was the watchword of all earth's races within a few hours of that momentous meeting. For the President and the heads of the earth's other governments sent statements in which Dr. Howard's suggested method of combatting the danger was stressed as the world's one chance. Thousands of air-mines must be made at once and continue to be turned out until the menace was repelled—scientists agreed, as one man, that it was the one possible way of fighting these grim visitors from space who were hovering in their enigmatic vessels at the surface of our atmosphere.

Within a half day after the meeting Dr. Howard and I, aided by several masters of aeronautical, chemical, and physical sciences had drawn up the plans of the air-mines. Each was to be a hollow steelite globe forty-two feet in outside diameter. This would give the globes a gross lifting power of about five thousand pounds and net of about twenty-five hundred. Attached in a special chamber at the side of each was the charge, a load of the most modern explosives, small in bulk but terrific in power, while striking-pins on the globe's sides made it inevitable that the charge be exploded whenever the globe was struck.

Through the night of the 6th, hundreds of men were busy in Washington turning out copies of the simple plans of the air-mine, and scores of planes were flying throughout the world with copies for all nations. On the 7th the manufacture of the great engines had already been begun in a hundred cities.

But on the night of the 7th the terror struck again. This time it was with small loss of life, but the psychological effects were far greater. It was upon upper Malaysia that the giant, glittering trawl descended, flashing down to rip a great trench of destruction through the jungle and along the edge of a native village, then flashing up again, leaving untold panic behind it.

The First Globe

AS best they could, the governments of earth sought to dissipate the panic, pointing out that few lives had been lost, and urging greater efforts in the production of the air-mines. Already the first great steelite globes were rolling out of the big factories, and were being quickly being fitted with the charge of explosives.

It was early on the morning of the 12th that the first air-mine was finished and released. Dr. Howard and I superintended the process, which took place outside one of the great Pittsburgh *steelite* works that was turning out the globes. Anchored securely to the ground, the globe was slowly exhausted of its air by the giant air-pump that had been equipped for the task.

The pump was disconnected. Then the globe was removed to a large open field near-by and reanchored. We could see clearly that the mighty globe, of incredible lightness, was straining upward with such force against the anchoring chains that held it that it seemed they must part. Dr. Howard reached forth and turned the lever that held the great globe anchored. There was a whizzing sound, a puff of air in our faces, and the great air-mine had vanished, rushing upward at such tremendous speed that it had seemed to disappear before our eyes.

We all gazed up after it, as though to follow its course upward until it floated at last on the surface of earth's atmosphere. I think that the same thought held us all. This air-mine, this single globe we had released—it seemed such a puny weapon to use against beings who from mighty ships had let down the colossal trawl upon us. Was there actually any hope for us in this method?

Perhaps this doubt was felt by many then, but there was no cessation of the work, which after all held our only chance of striking back at the great space invaders above. By the next day, here and there over earth's surface, scores of the air-mines were being released, to rush upward. In Germany and the English midlands, in Russia and Pennsylvania and Indiana—everywhere on earth's surface where the air-mines could be made and assembled—they were being released in groups.

The great industrial leaders of the world had gathered, under Dr. Howard's heading, to devise plans for the quantity production of the air-mines with the greatest possible speed. Already great factories were being hastily equipped with special machinery, and the explosive factories of the world as well as those producing the repelling devices were working night and day to manufacture the needed materials.

By the 15th, scores of the globes were being released each hour, here and there over the world, and their number was rapidly increasing. Dr. Howard was sleeping but two hours out of twenty-four, it seemed, remaining night and day at the Washington office that had become the center of the world's activities. He estimated that within a week the air-mines would be pouring forth at the rate of a thousand a day.

"The great danger," he said, "is that the next attack on us might hit one of the great cities so hard that the inevitable panic will cause a cessation on work on the air-mines."

"But how long is the work to go on in any case?" I asked. "There must be thousands of globes floating already upon the atmosphere's surface."

"There need to be tens of thousands, hundreds of thousands," he said solemnly. "They must be sent forth until these terrible trawlings from above have entirely ceased."

I shook my head, for I could see that already many, tired of the ceaseless work, were crying out that the scheme was a crazy one. Others had begun to say that whatever space visitors had been above had already departed. But these statements were swiftly silenced on the next morning, that of the 16th, by the fifth catastrophe.

This fifth blow took place at one of New York's residential suburbs, Scarsdale, and while it took a toll of life exceeded only by that of the Chicago horror, it was different from the others in one odd respect. The great trawl seemed to descend and gouge along the earth with somewhat smaller speed than in the other instances, and was seen very plainly and even escaped from in time by some people in the vicinty.

It was described as being very like the familiar steam-shovel scoop in shape, but of a glittering metal that all agreed was not native to the earth. The top of it, what supported it, ran up into the mists of the morning sky. They were many shining strands, and very slender for the colossal weight they supported. They gleamed with strange light and it was the opinion of many that if they were of metal they had in some unheard-of way been given supernatural strength.

At Scarsdale perhaps twelve hundred perished in the sweep of the giant scoop, which seemed to make a smaller gash than usual. A few who had heard the trawl crashing toward them had managed to flee from its path in time to escape it.

Hope and Fear

THIS fifth catastrophe marked the beginning of the terror's last period. Until then earth's peoples had hoped against hope that in some unexplained way the whole business was the result of natural forces, but now they could no longer doubt that far overhead were hovering vessels or vehicles dragging their trawls here and there over the earth's surface for their own unfathomable purposes. Dread was upon the earth! At any moment of day or night the giant trawl might crash down in terrible annihulation.

It was the sword of Damocles, suspended over a helpless world!

The days after the Scarsdale terror saw the world's activities at their most intense pitch. Dr. Howard and I were occupied without end in the direction of the manufacture aid distribution of the air-mines. For he was now having them released, not at the factories where they were assembled, but at various points over the earth, so that they would cover more uniformly the surface of the atmospheric ocean.

Day after day we sent them out. I know that to me those days were part of a dream of nightmare activity and tension. Again the world was waiting in dread for the coming of the great trawl. It did not come again, for reasons which we shall never guess, until the 19th That interval of three days between trawlings was the longest that had yet elapsed. We owe much to it. Perhaps our world.

For in those days the air-mines were whizzing upward in fast-increasing numbers. By the 19th they were ascending at the rate of more than a thousand a day. All of earth's peoples, in the industrial regions at least, seemed toiling upon the one task of making the great globes. The world's hopes were raised. We were winning, it seemed, by sowing the atmosphere's surface thick with air-mines that sooner or later must demolish all or part of the space invaders. We were exultant, even. And then—

Shortly after dark on the 19th a trawl flashed down to gouge most of the town of Martiana, in southern Norway, from the face of the earth.

On the morning of the 20th another trawl, or the same one, descended and gouged the bed of the Mediterranean just off Capri and in full sight of its shore.

A little before noon on the 21st a trawl was glimpsed plowing a vast wound in the Sudan desert near a British outpost. And three hours later a trawl cut a terrific trail of annihilation squarely across the city of Algiers

Earth and the races of the earth rocked beneath those fearful cataclysms, striking in such swift succession. With them the activities upon which are races of man had been so fearfully bent—the manufacture of the air-mines—began to dwindle. By the 20th the number of air-mines released had fallen off a little, and after the catastrophes of that and the next day it was even smaller. Dr. Howard's reports showed that on the 22nd but four hundred air-mines had been released in comparison with the twelve hundred released but three days before.

Mankind was giving up the battle in despair!

Panic was breaking loose over the earth, a panic and dread that nothing could restrain. Toiling thousands quit their work upon the manufacture of air-mines in hopeless despair. Mobs began to appear in the streets of London, New York, Shanghai, and Sydney, and rioting became general. The world was going mad with fear!

Dr. Howard strove above all else to keep the manufacture of the air-mines going. Under his urgent pleadings the governments of earth used their troops to protect and continue that manufacture as well as might be, instead of using them to suppress the growing riots. The production of the globes leaped again to almost

a thousand a day. Each day saw them whizzing up to join the thousands upon thousands already floating at the surface of earth's atmosphere.

And yet it seemed all so futile. It was not like striking back at a visible enemy, this frantic manufacture and release of the mines. Men would have been happier by far, I think, had they faced more terrible enemies in the plain light of day. I know that in those last days of an apparently disintegrating world I would have been easier in mind.

"It's a race against time now, Ransome," said Dr. Howard. "We cannot continue the production of air-mines much longer—and civilization is crashing now!"

"But is there no other way?" I cried. "My God, Howard, these air-mines are useless—we've sent up tens of thousands and they can be no more than a sprinkling in the vast extent of the atmosphere's surface. To try some other way—"

"There is no other!" he exclaimed. "Ransome, we must fight it out to the end! The air-mines—they're our one chance!"

"But we can't send up many more," I said. "The rioting in Germany has become so bad that all the factories save two that were making mines there have quit. We've no more than a dozen factories left in Europe and hardly more than that in America!"

"As long as we can release one mine we'll do so!" he declared. "Man's crisis is here—and he's got to have the courage now to fight in the dark against an unknown foe for his existence!"

Somehow Dr. Howard's indomitable will held together in those last days the thread of organization between the factories and their sources of supply, despite the wide-spread outbreaks that were going on. Fewer and fewer were becoming the air-mines released, but still they were being made and sent whizzing upward.

But on the 25th it became apparent to all that our last efforts were flickering out. Then late on that day came news of the tenth trawl. It had descended a hundred miles south of Rio de Janeiro to crash across a plantation with the loss of a score of lives. And hardly had that dread news spread around the earth than came word that the trawl had again flashed down a few hours later to gouge a terrific scar from the side of one of the peaks of the Peruvian Andes.

The end! With the spreading of those two reports its seemed so. For they so deepened the blind and unreasoning fear that had gripped mankind that the production of air-mines all but ceased on that day, only a few dozens continuing to be assembled and released. Panic-mad mobs caused chaos in the greater cities. Every organization of civilization seemed breaking down, and troops called to suppress wild outbreaks fought pitched battles with the mobs.

On the night of the 26th came the crisis for mankind. For it was known that all man's efforts to halt the menace from above had failed, that mankind lay defenseless beneath the grim and terrible invaders from beyond, who might at any time loose even greater horrors upon us. Man had fought an enemy he had never even seen and had lost! He had fought an enemy who apparently cared no more for the wrecking of mankind far beneath than we do of the insects beneath our feet!

Victory?

THROUGH the hours of that dread night I sat with Dr. Howard and with the last of our remaining organization in the Washington office. Outside, to the east the sky was red with the glow of flames, where a mob had set fire to looted buildings. From afar we heard the crackle of shots, the rumble of hurrying tanks, and the wild uproar of cries as troops sought to bring order out of the chaos of a dissolving civilization. We were silent, in a silence that made each minute age-long. And it was there, silent, almost toward morning, that the last messenger of mankind's hope found us.

He was a dishevelled young radio operator and it was some moments before we comprehended what he was babbling frantically forth to us. When we did, twenty minutes saw us in the air and speeding southward through the night with an army aviator.

Over the fear-mad, riot-blazing city and through the night out over other cities we sped, at the plane's utmost velocity, Dr. Howard peering ahead with face set, I gripping the cockpit's rim with nervous, trembling fingers. We were still speechless as our plane raced southward. It was not until dawn was streaking the sky eastward that the plane bumped down into a field a few miles from a little Georgia village.

We found men awaiting us, in uniform and civilian clothes, and all were half-hopeful, half-awed. Swiftly they told us what had happened.

Shortly after midnight citizens near the village had heard a faint, almost inaudible but clear sound of detonation, coming as though from far above. Almost in the next instant had come another detonating sound, as faint as the first, and then silence. But a few instants later, coming from the west of the village, they heard in quick succession two terrific prolonged crashings as of some thing or things falling from an immense height.

They had thought the trawl was descending on them, at first, and had fled from it for some distance. But after moments of hesitation they had made their way to the scene of the crashes, and what they found had made them get word quickly to the soldiers in a nearby town, whose first act had been to radio Dr. Howard.

The captain, who was the commanding officer, told this much to Dr. Howard; together we went across the grassy fields. Before us, as we rose over a slope, there loomed a great column of steam going up into the sparkling light of day. We went very near to it before we halted. So near that we could see even through its veiling mists great shattered masses of glittering metal, buried almost completely in the soft earth, from which they had smashed a huge crater in striking. We stared at it for a time, not daring to go nearer for the heat that had caused the steam still radiated intensely from the shattered metal. Not far across the fields was a thinner steam-column, and they told us that the colossal metal mass that caused it was buried even deeper in the earth, so deep that hardly any part of it could be distinguished.

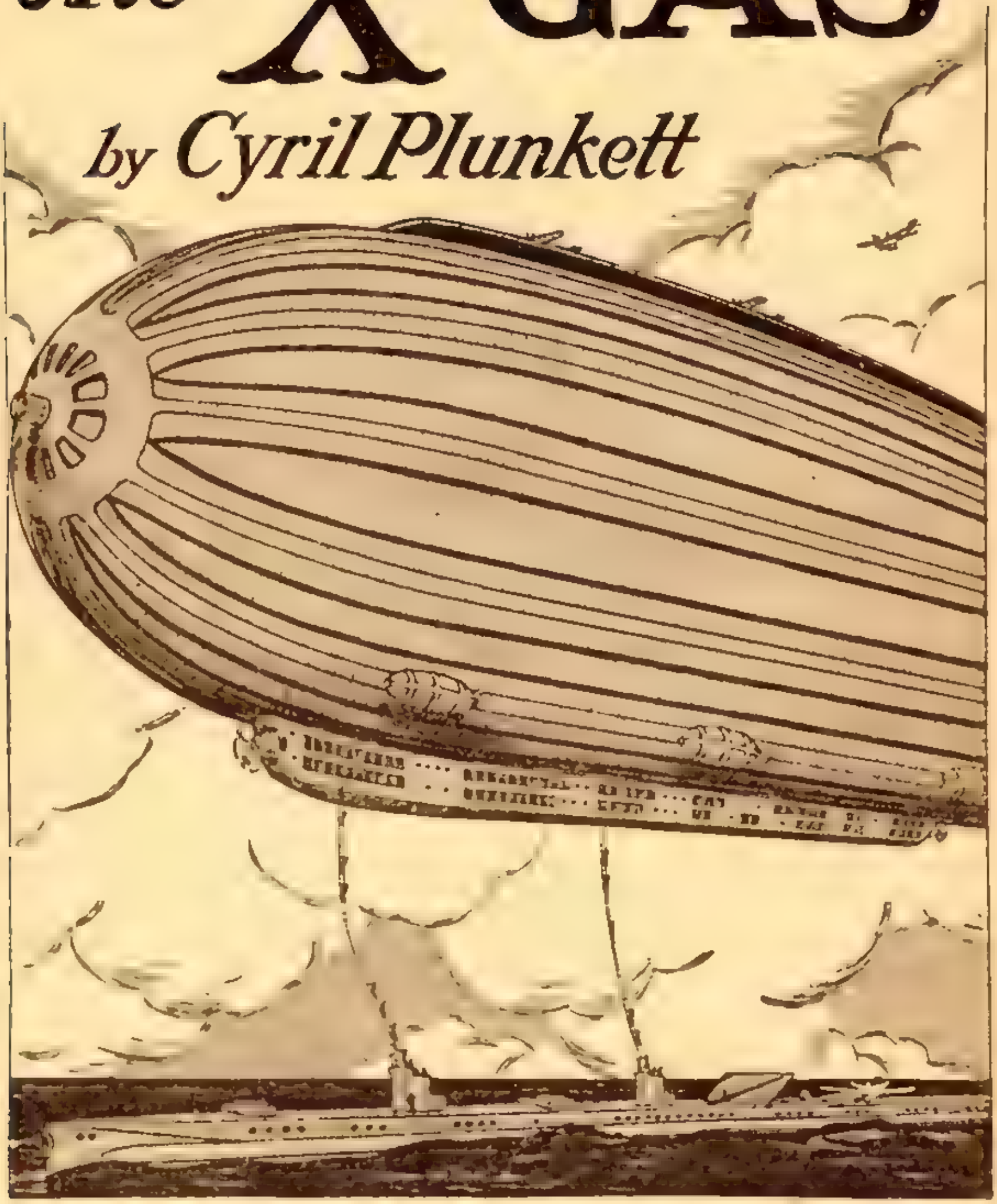
Dr. Howard and I stared at the two giant geysers of white vapor. It was victory, we knew. Victory, whether partial or complete, over the space visitors who had held earth beneath such a spell of terror. Far above, cruising on the surface of earth's atmosphere, two of their mighty vessels had struck a field of the air-mines we had released, had crashed in shattering annihilation through the dark night!

Victory! Yet it was not as I had dreamed the victory would be. I had thought of a wild climax after a terrific battle. It was so strange, so different. Just Dr. Howard and I and the khaki-clad soldiers and the wondering villagers, standing there in the soft light of the Georgia dawn, in the quiet fields with only the sound of birds about us, gazing so quietly toward those twin gigantic steam-columns. Then realization of what

(*Continued on page* 839)

The X GAS

by Cyril Plunkett



(*Illustration by Winter*)

The ship drifted lower and lower. Two ladders were lowered and they swarmed upward hard, evil-looking creatures. All were heavily armed. The lives of the entire crew were at stake.

COMMANDER MONTFORT glanced impatiently at his watch and turned again to the three Brazilian envoys.

"My Lieutenant Commander is late. We are already due to sail. However," he looked out of the window of the control cabin and continued slowly, "I might use the waiting time showing you further around the dirigible."

The three foreigners bowed. Relvuez, their spokesman, stepped forward.

"I should enjoy hearing more of your unique X-Gas. We are vitally interested."

Montfort smiled.

"No doubt you are. I'm sorry, Relvuez, but I can give you but little information on that point. Even if I knew the properties of this gas, which I do not, I would not dare impart them to you. Two years ago, in 1947, the American chemist Dunkley announced his discovery. He naturally turned it over immediately to the United States Government and it was called by the simple letter "X" to denote, intensify and publicize its mysteriousness. I might add that had we had this weapon five years ago, the war with your country would have been of much shorter duration."

Relvuez bowed again. "And perhaps you would even now be conveying a larger amount of gold back to Washington," he said.

Montfort smiled.

"A war debt is, after all, a war debt. And this trip and the transportation of part of the half billion in gold in the mighty *C-49* is another gentle hint against any more foolishness on the part of your government"

The Brazilians did not reply. An officer passed the door of the cabin. Montfort hailed him.

"Has Lieutenant Grennen arrived yet?" he asked.

"No sir," replied the officer.

Montfort again looked at his watch and frowned. He was about to speak when Relvuez interrupted him.

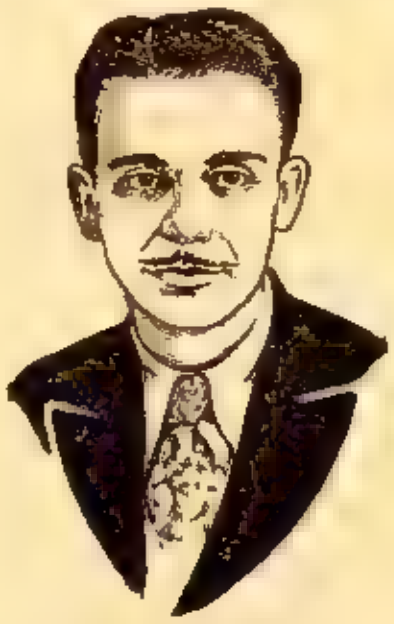
"But the principles of the X-Gas . . . ?"

"Ah, yes," Montfort nodded, "that I can explain. If you will follow me, gentlemen."

He left the cabin and walked down the narrow companionway to the observation deck

"You will note," he began, "that we have not deviated greatly from the early Zeppelin construction. The so-called bag, however, is smaller in width, manufactured of flexible lumalloy which is proof against storm, lightning, and, in fact, everything except explosives. That is our one vulnerable point—offset by the fact that we can easily navigate at a height of ten miles, at which height shells are notoriously inaccurate. Our vulnerability is therefore negligible. The bag is divided into compartments, ten of them. Six may be destroyed with little result. We generate our own gas, and can remain aloft one month without renewing the chemicals.

"Moreover, the gas can be, and is, burned. The special motor of this ship is the first to be used and it is similar to the Diesel engine still popularly used in airplanes. The gas is used as fuel, eliminating all sound save for a faint hissing, and guaranteeing four thousand horsepower for each engine. Since we have eight of these motors you can realize that our high speed of five hundred miles per hour is not impossible. The front and rear motors are attached to the cabin of the ship. The others, three on each side, are set in gondolas hanging from the bag. These are armored, and so placed for two reasons: First, they protect the vital points of the ship; secondly, the vapor thrown off in quantities by the engines is dangerous. Eight engines attached to the ship would inconvenience us to the extent of forcing us to wear masks continuously, which would detract from our efficiency. In a lesser degree, these vapors are harmless. We have, therefore, utilized the gas in small quantities within the ship. The controls, the hatches and elevator, and the disappearing guns, or rather their carriages, are automatically operated."



CYRIL PLUNKETT

"You have guns?" Relvuez asked.

"Certainly, for close work with any fortified area we are equipped with light guns. Personally, I don't think these were necessary since the X-Gas may be released upon our foes with dreadful results. It causes a thin, yellowing, impenetrable haze and, contrary to ordinary principles, *does not rise!* The world is therefore pretty much at our mercy. We can release this gas at a ten mile altitude, and I know of no craft now built that can successfully remain aloft and resist us ten miles from earth."

RECENT developments have shown that there is practically no limit to the size to which dirigibles may be constructed.

The invention and use of new metal alloys with which to cover the dirigible will give it greater and greater stability, and extend by a good measure its operating possibilities.

Of course, the dirigible's field of operation in war is limited because the larger it becomes, the more of a target it makes for the enemy artillery. To offset this, the dirigible can rise to great heights and therefore remain out of range of enemy aircraft. Mr. Plunkett in his thrilling story has shown us what the menace of a dirigible might be.

His story is simply filled with scientific incidents; and he shows in quite a dramatic fashion how in future warfare, waged between either individuals or nations, a new scientific device may suddenly turn the tide of battle.

Mr. Plunkett is a new author and he makes his entry into the field of science fiction in a very convincing manner.

An Unpardonable Offense

THE three looked at each other and nodded almost imperceptibly.

"Lastly," Montfort continued, "the bag is flat on the top and can receive or discharge planes. Since the surface is more than one thousand feet in length and two hundred in width we accomodate half a dozen large planes with ease. But contrary to popular thought, these planes with which we shall later be equipped will serve little purpose in warfare. Scouting is a thing of the past because of our new *teleretina*, the secret of which

is jealously guarded. I might add that it is entirely unaffected by nullifiers or radio or light rays such as might blind the human eye. It can, however, nullify itself, and so isolate the ship even from others of its kind. So you see, planes shall be used like the dory of old. In fact . . ." He stopped suddenly. There was a faint hissing from below.

A red light appeared on the auxiliary control board on the observation platform, flashed twice, and burned steadily.

"Lieutenant Grennen," Montfort said shortly. "Come, gentlemen, we will return to the cabin."

Below decks two sailors stood beside a very rumpled and disreputable looking young man. Save for their presence he could not have remained standing. His curly blond hair lay wet and matted over his forehead. His blue eyes appeared dull. As Montfort approached he passed his hand uncertainly before them, striving it seemed to brush away some disagreeable remembrance.

"Lieutenant Grenen!" Montfort thundered.

Grennen strove desperately to stand erect. He raised his arm to salute, but it fell numbly to his side. His mouth twitched. He wet his lips.

"Have you an explanation, sir?" Montfort continued harshly.

Grennen found his tongue. His words came forth haltingly, slowly, painstakingly.

"I have been the victim of foul play, sir. I was about to return to the ship, I think three hours ago, when I was accosted by two strangers. They appeared to know me and requested that we lunch together. We entered a place and . . ."

Montfort sniffed knowingly.

"And became drunk together!" he interrupted witheringly. "*Mister* Grennen, I am disappointed and disgusted with you. You are guilty of conduct unbecoming an officer and gentleman. You furthermore caused the ship's delay, which is unpardonable. You will go below, *under arrest!*"

Grennan recoiled as if struck. For the moment his shoulders drooped, his eyes seemed mutely to plead. Then he straightened. This time he saluted.

"Yes sir," he said.

Montfort turned to the three Brazilians who had stood silently watching, and shrugged, dismissing the affair. But to Grennen, his mind still hazy, his disgrace began to loom up tremendously. He entered the elevator with his escort. The car sank noiselessly downward, stopping at the lower deck. One of the sailors asked instructions of an officer and was directed to the stern. A small door was opened and Grennen shoved into an unused storeroom. The door swung shut, the latch caught, and he was alone.

He sat down on a bench and groaned. Not even to be allowed his own quarters! A virtual prison! His head throbbed and ached. He rose and walked to the tiny window, opened it and gratefully gulped in the air. The ship vibrated slightly, there was a gentle hissing and it began to rise swiftly. Grennen stood by the window as they glided gracefully out over the ocean. The land faded quickly into the distance, and with it seemed to go the last of his hopes. Soon, too soon, they would reach Washington, a court martial and dismissal from the service would inevitably follow—a stigma he could never live down. He shook his head sadly. His life would be forever ruined.

To understand Grennen's feeling of inevitable disgrace, one must recollect the change in social affairs and moral ideas that had occurred.

With the close of nineteen-forty the crime problem had seemed forever solved. Science had succeeded, through a photostatic arrangement, in detecting criminal tendencies in the brain of a person beyond the age of puberty. At first, the claims made for the new device were deemed impossible; but its proved success had caused its almost universal use these last nine years. The device was based on the idea that the brain at this age contained every incentive which might later develop into unsocial conduct, or criminal tendencies. These incentives or tendencies could be recorded, and the unusual youth or girl then carefully watched and trained until it was certain that the tendency was overcome. The theory of heredity as previously propounded was therefore agreeably changed. Hardened criminals were soon rounded up, and any deviation from the straight and narrow path gradually came to be looked upon, not with shock, but with contempt. With this change came new social ideas. To drink at all was to lose dignity . . . in the service it was not tolerated. Drinking and stealing were classed as similar offenses against society. The charge which Montfort would register would mean, therefore, that he, Grennen, would be forever an outcast if he escaped a jail sentence.

He left the window and sat down. With the rush of air his head had cleared somewhat. He was able to think more clearly now, to reconstruct the events of the last few hours—at least those up to the time he had met and dined with the strangers.

They had, as he had said, appeared to know him. Rather than cause them any discomfiture, he had agreed to lunch with them. There had been a peculiar drink, having a strange taste, he remembered that now, served with the meal. Try as he would, he could remember nothing further except that he had talked much, and had finally sunk into unconsciousness. The next thing he knew he was stumbling toward the port to meet Montfort . . . and disgrace.

The Submarine

AN hour passed and Grennen's misery was in no way alleviated. The ship's bell rang for dinner. Soon steps sounded outside the door. It was opened and a tray was handed him. Grennen looked up eagerly.

"Can you tell me . . ." he began but stopped quickly for the other's lips had curled and without a word the guard had turned and left the room.

Grennen sank back on his bench. His own men were cutting him. He sighed. He ate sparingly. The food was tasteless to him, and once again he turned to the window. The speed of the great ship had diminished by half. They were now traveling northward at but two hundred and fifty miles per hour, and much lower than usual, not more than six thousand feet. Far below he could see the ocean. Suddenly a speck caught his eye. Powerful glasses hung by the window. He grabbed them and trained them on the speck below. It was a submarine just coming to the surface. Its tower opened and men poured out onto the deck. Oddly, *they did not once raise their heads!* The *C-49* was easily distinguishable at its present height and Grennen wondered at their lack of interest. He endeavored to determine the ship's nationality, but it showed no sign or colors. He frowned. It was directly beneath them now and seemed to leap ahead at increased speed. He decided it was traveling at about seventy-five miles an hour. From the way in which it *rode* the waves containing millions of drops of water—each a natural self lubricated ball bearing—he judged it could easily attain the terrific surface speed of more than one hundred miles per hour. He was about to turn from the window

when a shadow passed over him. The sun, sinking in the west, had been momentarily obscured. This time Grennen looked up. Four planes were circling over the ship.

He brought the glasses up, but as the planes were armored, he could not see within their slotted cabins. He judged them to carry four men each, and estimated their whining, nearly soundless motors capable of a speed of three hundred miles. They were equipped with the standard helicoptic propeller to facilitate their landing in a hundred foot area. They appeared to be signaling the *C-49*. Grennen's view was obstructed by the port gondolas so he could not catch the signals; but presently the dirigible slowed and a moment later he felt a thud as the first of the four planes touched the bag overhead. They were landing!

Grennen's forehead wrinkled in perplexity. Roughly, he decided they were about six hundred miles east of Panama, perhaps much to the south of this. The planes could conceivably belong to the U. S. Navy, except that they were in no way marked. It followed, therefore, that this might be a naval manoeuver, the orders for which had been radioed in. Still . . . but Montfort would not stand by unless he had orders!

The four planes had landed, but the *C-49* did not pick up speed. Grennen paced the floor. It was in a moment such as this that his disgrace hit him acutely. He should be now in the control cabin, directing the ship while Montfort received the visitors. He should be sitting at his desk while navigator and pilot would await his orders. Instead . . . he was under arrest, and through no fault of his. He had not been drunk; he had been drugged. But Montfort would not believe it. An inquiry would not prove it.

His thoughts were interrupted suddenly by a rush of feet on the deck above. Grennen strained his ears. That would mean the strangers had descended in the elevator. They would walk forward to the control cabin; Montfort would receive them; they would exchange a few polite words and . . . He stiffened. Without warning, bedlam broke out above him; cries, hoarse, terror-stricken shouts. What could that mean? He fancied he could hear the click of the silencer guns; most certainly the repeated thuds were the spattering of flying bullets! Grennen doubled his fists and his blue eyes flashed. Could these strangers be actually capturing the ship? He rushed to the door and threw his weight against it. It held. Again and again he tried, but without success. He must break free. Every man was needed above.

He looked out of the window. The ship was settling down closer and closer to the ocean's surface. It was a bare thousand feet high now.

The outbreak ceased as quickly as it had begun. What of the motormen in the gondolas, the mechanics below decks? Could they save the ship or were they also held at bay? A passing shadow caused him again to look up. He counted five bodies being flung into the sea. These were the field men from above. Murder! Wholesale murder! Sixteen men had conquered this super-dreadnaught of the air! It was unbelievable. There was trickery here. They had, somehow, cleverly gotten around the cock-sure pompous Montfort. Even so, could sixteen men operate this great air liner? And what would they do with her? The money aboard, the millions in gold . . . He could understand that, but . . . The *C-49* began to settle rapidly. Beneath them was the submarine they had so recently passed.

The men on its deck seemed waiting eagerly now. Two ladders were lowered and they swarmed upward; hard, evil looking creatures. All were heavily armed The lives of the entire crew were at stake. These murderers would stop at nothing. Montfort must have been mad not to resist attack, foresee what would happen and forestall them; or else these pirates were shrewd. Grennen could only guess how they had accomplished their mission, Montfort had, of course, received them in his cabin. The control cabin was just ahead. It was but a step to it, and, once there half their task was accomplished. Undoubtedly the *teleretina* experts and radio men had been deceived with a fake message and overpowered. Perhaps the crew had not even been armed, or within immediate reach of arms. And with the control room in the pirates' hands, the terrible gases were useless. The ship was isolated and captured.

Grennen Resolves

THE last of the men below had climbed aloft. The submarine turned westward and slipped beneath the waves. The dirigible, hissing softly, began to rise. Men were running about the companionways. There was another spatter of lead, probably the crew's last rally . . . and surely without success. Grennen cursed. He could do nothing, nothing. He sat down. The motors hissed. The giant ship turned and headed westward in the wake of the submerged submarine. Grennen's mind began to work swiftly. They were bound, doubtless, for Bolivia, or the wilds of Paraguay. Once over the jungle they were safe from detection. It would be hours before the Navy Department would begin to worry over the *C-49's* absence. Radio and visual communication were of course already broken. This would as yet, cause the government no fear. The duplicate set in Washington had a range of but one thousand miles. Even later, when they failed to pick up the ship, they would think the *teleretina* had been temporarily broken. They would never dream its nullifiers were at work against its own government though the ship was within range.

And when, finally, suspicion did come—what could the United States do? If these men had a clearing in the jungle they could take days in removing the gold which they had doubtlessly captured the ship for. Though a navy scout should finally spot them and return with hordes of planes, the *C-49* would emerge supreme. There was not another ship built that could defeat it. Why, equipped as it was for a month's voyage, and with its high speed, it could subdue half the world! Subdue the world! Perhaps that was their goal. But it was too fanciful, too absurd. Yet what was absurd about it? The X-Gas would place whole countries at the bandits' mercy. It would kill thousands at a stroke. Planes would fall like flies before it, and the giant would ride safely above it all. Masks were useless, except the few with which its inventor Dunkley and his aides were equipped. Dunkley was at Lakehurst, supervising the building of a sister ship which would not be finished for months. Could it be true, this wild thought? Grennen hoped profoundly it was not.

He ran his hands through his thick blond hair. His eyes glinted and his mouth became firm. Of the entire crew, he alone remained free. True, he was a prisoner but the pirates at least did not know of his presence. He turned his thoughts immediately upon a means to escape. If he succeeded in gaining his freedom it might mean death at the hands of these murderers. Yet, if he remained where he was when the *C-49* was saved, he would be court-martialed and disgraced. To a navy

man death is infinitely sweeter. Disgraced for life. An outcast. Never! He would die first; but die in battle, die in an attempt to save his ship.

He slipped off his tunic and shirt. He did not wish to be hampered by clothes, for this was to be a battle to the death with all the odds against him. The storeroom in which he was locked was in the stern of the ship. The rooms just next to his contained the explosives, and the bomb magazine; both on the lower deck. If he could gain his freedom and reach the magazine . . . then the companionway and elevator . . . The crew was doubtless penned in the bow, on this same deck. The pirates would be careless now. With four or five of the crew to aid him, with his knowledge of the ship and with access to the magazine they might successfully negotiate the elevator and reach the upper deck. Hadn't the ship been captured with but sixteen men?

Once within the control cabin, they were certain of victory. The ship could be destroyed as a last resort . . . with the X-Gas!

He cast his eyes about the room for some kind of weapon. He spied a heavy wrench. His hands closed over it lovingly. His lips opened in a smile, but a smile of ruthless determination. He returned to the door. Listening carefully, he soon heard steps from without, the steps of a single man. He tapped softly. The steps ceased. For a moment there was no sound save the faint hissing of the motors. Grennen's nails bit deep into his hands. The man must come to the door. He thrilled suddenly. The steps had moved toward him! The door was fitted with a latch. Anyone could open it from outside. The latch lifted. The door opened slightly. Grennen leaned far back of the door. A black, dirty head was thrust inside. The wrench descended with a dull thud. Grennen caught the body, dragged it inside hastily, and shut the door, careful not to latch it. Quickly he divested the man of his filthy garments and slipped them on over his own. Gripping the wrench tightly, he opened the door. He was for the moment free!

Like a cat he hurried forward to the magazine. The door, fortunately, was not set. In time of combat it was controlled by means of the gas, a newly-evolved principle of hydraulics. Now a latch similar to that on his recent prison was his only obstacle. He was inside in a twinkling and breathed more freely. No one had yet discovered him. Surrounding him were tons of high explosives. He chose a light demolition bomb, a recent discovery. It was small, but capable of destroying a vessel completely. He stuffed an automatic into each pocket. His heart beat strangely. Everything depended upon the next few moments.

Keeping well against the lumalloy walls, he began his perilous trip forward He reached the elevator unnoticed. A dangerous plan suddenly presented itself. Garbed as he was, and fully acquainted with the ship, why could he not rise to the upper deck and reconoiter? To think was to act. He stepped within the elevator, threw in the switch and rose rapidly. The red light in the control room would flash and burn but these men in command of the ship would think little of that! He left the elevator and crept cautiously down the companionway. Suddenly he stopped. In Montfort's cabin he caught the sound of voices. He listened.

"We will shortly be over the land," someone was saying.

"Is Montfort in the control cabin?" another asked shortly. Grennen recognized it as Relvuez—an official in the Brazilian government—whom he had previously met.

"Yes sir, and heavily guarded. He has resigned himself, apparently."

"Watch him carefully," Relvuez ordered. "He must supervise but not touch anything. Fortunately I have learned enough of the ship to guard against all surprise." He chuckled. "He never suspected us. And you, Rempoti, you have served us well also, in delaying the ship to give the submarine a start and in . . ." he laughed, "in pumping the young Lieutenant."

"We were successful," Rempoti agreed. Grennen stopped breathing. It was the voice of one of the men he had met in Rio, one of those who had been responsible for his downfall. "The Pophilian drug has never been known to fail," Rempoti was going on. "It causes one to talk and leaves no knowledge of what one has said."

Battle in the Corridors

GRENNEN shuddered. So because of him the ship had been lost. He had failed his country, his sacred charge, the *C-49*. His fingers itched to get around this smug Rempoti's throat, to crush his life away; to render lifeless the scheming Relvuez. He restrained himself with an effort and listened.

"We are perfectly safe now," Relvuez drawled. "The nullifiers prevent the ship from being sighted by television. We are cruising at a height of eight miles; no one below can see us. We will therefore proceed to our destination, unload the gold, acquaint ourselves perfectly with the ship and its use and then . . ." he paused and sucked in his breath, "Washington and Lakehurst first, to capture Dunkley. If not . . ." he shrugged, "we will destroy the country."

"And what of Brazil?" Rempoti asked laughing.

"She has served her purpose in giving me authority to enter this ship. We are through with her . . . unless we get Dunkley. Then she will fall like the rest. The gold means a beginning. It will enable us to build other ships. Within two years we will own the world. It is a pleasant prospect."

Grennen shuddered again. So his fanciful idea had not been wrong! These men actually did aspire to world dominion! And with ships such as the *C-49* equipped with its terrible gases, that dream could become actuality! He backed away cautiously. He must not fail. More than his satisfaction—people, millions—depended upon it now. As the elevator shot downward he drew one of the Colts, modern, hard hitting, and nearly soundless, from his pocket. The elevator stopped. The door flew open. Grennen stiffened in amazement Two men stood questioningly before it, their faces blank with surprise.

Grennen's pistol flew upward, his finger contracted on the trigger and with a purring of the whirling mechanism bullets spurted forth soundlessly. But the men were fully alert. They fell to the floor and their weapons poured out lead. One crumbled, the other wavered and scrambled away, crying out as he went. There was no time for delay now. Already others from the stern were rushing forward. Grennen backed away shooting as he went. The bomb he could use only as a last resort. It was to be the deciding factor above, and success was not yet out of his grasp. He only hoped Relvuez and his companions had not heard the cries below. Three men now opposed him. Grennen discarded his empty pistol and began on the second. He felt a thud in his shoulder, in the fleshy part of his leg. A bullet creased his cheek. Desperately he fought back. One, then two fell before his withering fire. The

third took to his heels. For an agonizing moment Grennen waited breathlessly. If the fellow caught the elevator and went above all was lost. But fear caused him to fly onward.

Grennen whirled, ran toward the crew's quarters and burst within. A dozen bound men lay on the floor. He worked feverishly, loosened one, armed him, ordered him to the magazine for guns, and then turned to the next. Five he freed. They followed him to the elevator. A savage horde, having regained their courage, met them creeping up the companionway. With a flash of shots Grennen's men flung them backward. Then they were in the elevator shooting upward. He jammed it at the top. Those below must use the stairs and they could be guarded.

Accompanied by three of his party Grennen turned to Montfort's cabin. All was suddenly still within. The navy men halted uncertainly. If Relvuez and that part of his gang who were with him had heard, had knowledge of this attempt . . . The control cabin was beyond Montfort's. To gain access there, Relvuez must be passed. Grennen weighed his chances swiftly, threw back his shoulders and motioned his men forward. They were beside the door when it was flung open. Relvuez stood outlined, gun in hand.

"Do not be hasty, gentlemen," he said softly. "You are covered from the windows, from the companionway in your rear and," he nodded toward the other side, "from your left." Even as he spoke a square on the side of the ship opened noiselessly and trained on them from the motor gondola were two ugly looking automatics held by stern men. Grennen cursed softly. He had not reckoned on this. He had indeed, forgotten the emergency exit with its catwalk to the forward motor.

"You did not think," Relvuez continued purringly, "Lieutenant Grennen. In fact you are notoriously impulsive. How could you forget that visual telephonic communication is so wonderful a part of this ship? Your brief success below was, I confess, worth an honorable mention, but once it was reported we watched your progress on the screen."

How could he have been so dense, Grennen thought, as to forget the ship's internal television? To have gained the upper deck and be so easily caught! And Relvuez smiling, deriding him! It was damnable. Was he to go down in defeat after coming so close to his goal? It was unthinkable, armed as he was, an eager automatic in his hand, another resting in his pocket, and the demolition bomb. . . . He had for the moment forgotten that! With studied carelessness he looked downward, let the pistol clatter to the deck. He backed away out of range of those stern motormen.

"I guess you win, Relvuez," he said ruefully. He put his hand in his pocket as though ready to shrug dismally. His eyes lighted as Relvuez smiled with satisfaction.

"It is useless to oppose us," Relvuez was saying smugly. "We have absolute control. In fact . . ." His face blanched suddenly, for Grennen had drawn forth the bomb.

"Not a move," he cried. "If you, any of you, as much as twitch an eye, I'll blow you all to hell. These things work fast." He turned to his comrades. "One of you come with me. The others stay as they are so as to cover me from the guns behind." He backed away, reached the control cabin, stopped at the door.

"Come out, pilot," he ordered, "and with your hands up."

"Grennen!" came Montfort's joyful voice. "Thank heaven!"

Grennen spoke rapidly to his aide.

"Free the Commander and both of you remain at the controls. Keep your hand on the gas release. With that in your power they can do nothing but surrender."

He waited a moment, and was rewarded by Montfort's eager exclamations as he regained his freedom.

"All right, Lieutenant," Montfort called. "We have everything under control."

Grennen's heart sang. He walked back slowly toward the raging Relvuez.

"You might as well surrender," he said softly. "Unless you do there can be but one result. We have the X-Gas under our control. To storm the cabin will mean your death for, as you no doubt know, the gas can be released instantly."

Relvuez shrugged this time. Grennen put the bomb back in his pocket, brought forth his extra pistol. He waved it at Relvuez's men.

"Come forward to be searched and relieved of your gu . . ." He stopped and whirled like a top. He had walked into range of the motormen, who, either not hearing or caring, had opened fire. Grennen's gun spat. His left arm hung useless. Blood streamed down his face. One of the motormen slumped forward. Over the body the other raised his gun. Simultaneously he and Grennen shot. The pirate doubled over but Grennen whirled again. He dropped his gun and grasped for his left pocket within which nestled the bomb. He tugged at it. Equipped with cap-like fuses, these bombs, when the cap released, explode within fifteen seconds. But Grennen's injured left arm was useless. In vain he sought with his right hand to free himself of the death-dealing bomb. His thoughts moved with the speed of light. He jumped free of the companionway, out on the narrow catwalk leading to the gondola. Five seconds, ten were gone, for the cap had been shot miraculously away with the last bullet! Five seconds more and the ship and all its men would be blown to bits!

Grennen made one more last desperate effort. He saw his future, a picture-like flash. Court-martial, disgrace. Only one thing could clear his record. He had set out to save his ship. That he must do though he forfeited his life. He waved his arm in farewell and jumped. A cry behind him, floating, despairing! A mement through space! A thunderous report! The ship rocked and swayed. It seemed to buckle, then eased itself. It was safe.

Pirates and crew sighed with relief. Montfort stood by the control cabin doorway.

"Men," he said to his followers, "Lieutenant Grennen has given his life for us. He has rescued us and prevented destruction and loss to the government. But the government repays all favors. His one mistake must never become known. He has died an officer and a gentleman."

THE END

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Showing the path of an artificially-produced lightning bolt as it strikes a 3-foot model airplane. This unusual photograph was taken to determine just how the lightning affects planes in motion; shows how the plane can become a part of the path of the bolt.

A Test of Airplane Lightning Hazards

By WALTER E. BURTON

ARTHUR O. AUSTIN, chief engineer of the Ohio Insulator Co. of Barberton, Ohio, and an authority on electrical insulation, power lines and high-frequency currents, is conducting a series of tests to determine the effect of lightning on airplanes. The research is being carried out at the most powerful outdoor high-voltage laboratory in the world, located at Barberton.

With the equipment available, artificial lightning bolts of several million volts potential are being hurled at models, plane parts and full-sized planes in an effort to determine scientifically, for the first time, just what happens when a flying plane is struck. Although no results have been announced, preliminary experiments with models indicate that, as the accompanying photograph shows, a plane can really become part of the path of a lightning-bolt.

Mr. Austin and his associates are investigating a number of problems. One of these is the effect on the pilot of shock resulting from a sudden collapse of the electrostatic field that surrounds a plane flying near a charged cloud or other charged field. It is believed that the shock may be so powerful that the pilot will lose control of his ship for a time. The effects of intense sound, caused by a collapse of the atmosphere following the passage of a discharge near a ship, are also being analyzed.

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Showing the path of an electrical discharge between the high tension lines above and the ground. The gas-filled ball—representative of a balloon or dirigible—has escaped damage by means of a lightning shield. The path of the bolt shown in the lower left is into the ground.

Engineers are exploring the fire hazard—trying to determine the likelihood of lightning igniting the fuel tanks, setting fire to wing and body fabric, and fusing metal parts. The ignition system is being subjected to analysis to determine whether or not it is likely to break down, and whether insulation will give way under a lightning discharge. The contention that hot exhaust gases form an ionized path near the plane, a path tending to provide a route for a lightning discharge, is being studied. Other

experiments concern the structure of the plane itself, the effectiveness of accepted methods of bonding, and so forth.

It is expected that much data will be amassed, useful to plane operators and to designers. In cases where the structural design of a plane creates lightning hazards, it has been found that the remedy is simple. Preliminary tests indicate that the fear of lightning that most persons experience while flying will be shown to be without scientific

[illegible]ie series of experiments has been in progress for several months, and is expected to continue for some time into the winter. Compilation and studying of data will not [illegible]e place until after the tests have been concluded.

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A number of copper balls are shown suspended in the air in order to test the effect of "lightning" discharges. They are called sphere gaps for between them the great spark is passed that constitutes an equivalent of lightning.

Use Largest Transformers

SOME of the tests will be attended by representatives of the Department of Commerce, the Army and Navy, Bureau of Standards, Weather Bureau, National Advisory Committee for Aeronautics, leading manufacturers and airline operators, and other interested. Planes, engines and parts are being provided by various manufacturers and other groups.

The laboratory where the tests are being made is interesting in itself. Three of the largest transformers ever constructed stand in the courtyard of a former millionaire's cow barn. These units, working together, are capable of producing an impact discharge of 3,300,000 volts, measured to ground. The amperage runs into the thousands. Additional equipment now being installed will increase the power to a considerable extent.

There are several oscillator units that produce continuous spark discharges many feet in length; Klydonographs, oscillographs and a special synchronized camera for making permanent records of tests. There are also four pairs of huge sphere

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[illegible] are the transformers of the [illegible] Company that provides the voltage to produce artificial [illegible] the actual work of the effect of lightning on airplanes

ing each 150 centimeters eter, and weighing over ½ lightning. A collection of more than 50 different trans-

to be seen. The entire laboratory looks more like a scene from a fantasy than a place where highly practical tests and scientific research are being carried on. The equipment at the laboratory is valued at more than $2,000,000.

Most Material Speculative

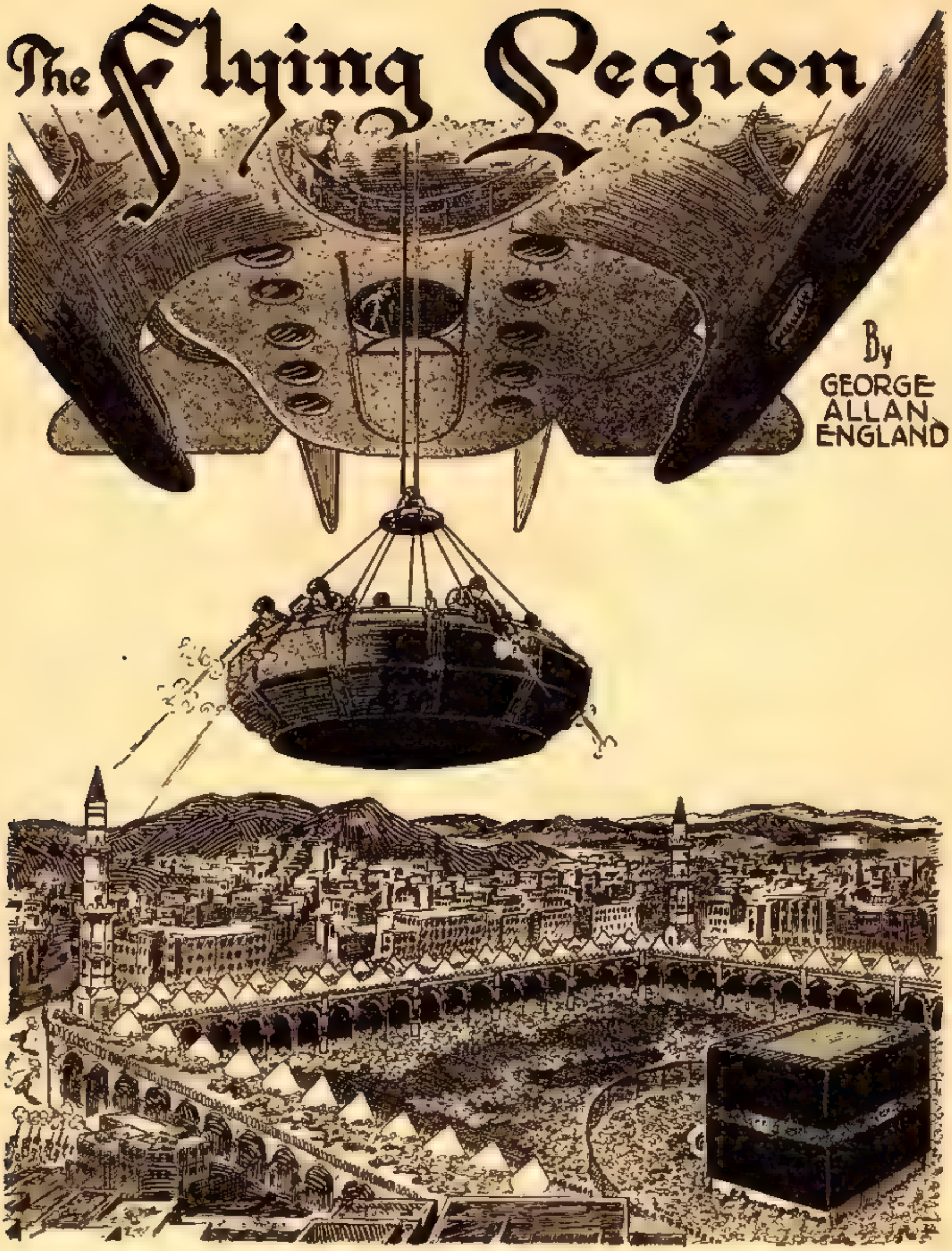
IN connection with the plane tests, an insulated sling has been constructed for the purpose of suspending airplanes while they are being subjected to artificial lightning bolts. A Ford trimotored ship can be accommodated, and some of the tests are to be conducted with full-rigged ships with motors running and fuel tanks filled.

This is believed to be the first time that the problem of the effects of lightning on an airplane has been attacked on an engineering and scientific basis. There is extant a surprisingly small amount of reliable information about such matters, and most of the available material is of a highly speculative nature.

[illegible] whose [illegible] article points out how little is really known concerning [illegible] with flying machines have never been adequately [illegible]le.—EDITOR)

The Flying Legion

By GEORGE ALLAN ENGLAND



(Illustration by Paul)

Into the arcade at the northeast corner and halfway along the western side, two furious swarms of white-robed Hujjaz were debouching. Lebon and Rennes, turning loose the machine guns, mowed into the white of the pack.

What Has Gone Before

The Master, a soldier of fortune, gathers together a Flying Legion of former soldiers, to make an exploration of Arabia.

They steal a huge airplane and fly over the Atlantic. One of the members of the Legion was a masked man named Captain Alden, who finally is revealed as a beautiful woman, who had served in the Great War as an aviator.

Nearing the coast of Africa, the Legion, now outlaws, are attacked by a great fleet of the International Air Police, but by a mysterious ray the Master sends all of the attacking planes down to the water.

A stowaway on the airliner sets fire to it but the crippled ship manages to navigate to within a few hundred feet of the African coast.

There the Legion is attacked by a band of Arabian outlaws. But by means of a lethal gas, the Master puts the Arabs to sleep and captures their leader, called Abd el Rahman, a Moslem infidel, and a priceless Moslem religious gem called the Great Star Pearl. Returning to the airliner, the Legion repair it and fly over Africa and finally come within sight of one of their objectives, the City of Mecca.

CHAPTER XXX
Over Mecca

THE descent of the giant airliner and her crew of masterful adventurers on the Forbidden City had much the quality of a hawk's raid on a vast pigeon-cote. As Nissr, now with slowed engines loomed down the Valley of Sacrifice, a perfectly indescribable hurricane of panic, rage and hate surged through all the massed thousands who had come from the farthest ends of Islam to do homage to the holy places of the Prophet.

The outraged Moslems in one fierce burst of passion against the invading Feringhi, began to swarm like ants when the stone covering their ant-hill is kicked over. From end to end of the valley, a howling tumult arose.

On the Darb el Ma'ele, or Medina road, a caravan bearing the annual *mahmal* gift of money, jewels, fine fabrics and embroidered coverings for the Ka'aba temple, cut loose with rifles and old blunderbusses. Dogs began to bark, donkeys to bray, camels to spit and snarl. The whole procession fell into an anarchy of hate and fear.

The vast camp of conical white tents in the Valley of Mina spewed out uncounted thousands of *Hujjaj* (pilgrims), each instantly transformed into a blood-lusting fiend. From the Hill of Arafat; from Jannat el Ma'ala Cemetery; from the dun, bronzed, sun-baked city of a hundred thousand fanatic souls; from the Haram sanctuary itself where mobs of pilgrims were crowded round the Ka'aba and the holy Black Stone; from latticed balcony and courtyard, flat roof, mosque and minaret, screams of rage shrilled up into the baked air, quivering under the intense sapphire of the desert sky.

Every crowded street of the bowl-shaped city, all converging toward the Sacred Enclosure of the Haram, every caravanserai and square, became a mass of howling *ghuzzat*, or fighters of the faith. Mecca and its environs, outraged as never before in the thousands of years of its history, instantly armed itself and made ready for a Jihad, or holy war of extermination.

GEORGE ALLAN ENGLAND

WITH the third installment of this masterpiece of aviation science fiction, we are approaching its most exciting incidents. The wisdom of the East and the ability of the Orientals to provoke perfectly amazing feats of magic have always been a mystery to us occidentals. But we must realize on reflection that the so called magic is nothing more or less than tricks of nature and as such can be duplicated.

In this game the Master is indeed supreme and, as we will learn, he can match any magic with his own scientific devices.

The flood of enthusiastic letters we have received about "The Flying Legion" only reenforces us in our opinion that this is one of the greatest air stories that has ever been written.

Where the Alh Bayt, or people of the black tents, had tamely enough submitted to the invaders, these Ahl Hayt, or people of the walls, leaped to arms, eager for death if that could be had in the battle against the infidel dogs—for death, so, meant instant bearing up to Paradise, to cool fountains and sweet fruits, and to the caresses of the seventy entrancing houris that each good Moslem has had promised him by "The Strong Book," Al Koran.

Every man and boy in all that tremendous multitude spread over many square miles of rocky, sun-blistered aridity, seized whatever came first to hand, for the impending war, as the black shadow of Nissr lagged down toward the city and the Haram. Some snatched rifles, some pistols; others brandished spears and well-greased *nebut* clubs, six feet long and deadly in stout hands. Even camel-sticks and tentpoles were furiously flung aloft. Pitiful, impotent defiance, no more effective than the waving of ants' antennae against the foot that kicks their nest to bits!

Screams, curses, execrations in a score of tongues mounted in one frenzied chorus. Swarms of white-robed pilgrims came running in masses after the drifting shadow, knocking each other down, falling over tent-pegs, stampeding pack-animals. The confusion amazed the legionaries as they watched all this excitement through their powerful glasses.

"It looks," thought the Master with a smile, "as if our little surprise-party might be a lively affair. Well, I am ready for it. 'Allah knows best, and time will show!'"

All over the plain and through the city, myriads of little white puffs, drifting down wind showed the profusion of firing. Now came the boom of a cannon from the Citadel—an unshotted gun, used only for calling the Faithful to prayer. Its booming echo across the plain and up against the naked, reddish-yellow hills, still further whipped the blood-frenzy of the mad mobs.

Even the innumerable pigeons, "Allah's announcers,"*

*So called because of their habit of cooing and bowing. Moslems fancy they are praying to Allah and making salaam to him.

This story started in our January issue. Back numbers can be had at the rate of 25 cents each.

swirled in clouds from the arcades, mosques and minarets surrounding the Haram, and from the Ka'aba itself, and began winging erratic courses all about the Forbidden City. Men, birds and animals alike, all shared the terror of this unheard of outrage when—according to ancient prophecy—the Great Devils of Feringhistan should desecrate the holy places.

"Slow her!" commanded the Master into the engine-room phone, and began compensating with the helicopters, as Nissr lagged over the crowded city. "Shut off—let her drift! Stand by to reverse!"

Mecca the Unattainable now lay directly beneath, its dun roofs, packed streets, ivory minarets all open to the heretics' gaze from portholes, from the forward observation-pit and from the lower gallery. As Nissr eased herself down to about 1,000 feet, the plan of the city became visible as on a map. The radiating streets all started from the Haram. White mobs were working themselves into frenzy, trampling the pilgrims' shrouds that had been dipped in the waters of the well, Zem Zem, and laid out to dry.

Not even the Master's aplomb could suppress a strange gleam in his eye, could keep his face from paling a little or his lips from tightening, as he now beheld the inmost shrine of 230,000,000 human beings. Nor did any of the legionaries, bold as they were, look upon it without a strange contraction of the heart. As for the Apostate Sheik, that old jackal of the desert was crouched in his place of confinement, with terror clutching at his soul; with visions of being torn to pieces by Sunnite mobs oppressing him.

And Rrisa, what of him? Shut into his cabin, with the door locked against intrusion, he was lying face downward on the metal floor, praying. For the first time in the world's history, a Moslem's *kiblah*, or direction of prayer, was directly downward!

"Reverse!" ordered the Master. Nissr hovered directly above the Haram enclosure. "Lower to five hundred feet, then hold her!"

The airliner sank slowly, with a hissing of air-intakes into the vacuum-floats, and hung there, trembling, quivering with the slow back-revolution of her screws, the swift energy of her helicopters. The Master put her in charge of Janina, the Serbian ace, and descended to the lower gallery.

An Astonishing Change

HERE he found the crew assembled by Bohannan and Leclair ready for the perilous descent they were about to make. He leaned over the rail, unmindful of the ragged patter of bullets from below, and with a judicial eye observed the prospect. His calm contrasted forcibly with the frenzied surging of the pilgrim mobs below, a screaming, raging torrent of human passion.

Clearly he could discern every detail of the city whereof Mohammed wrote in the second chapter of the Koran: "So we have made you the center of the nations that you should bear witness to men." He could see the houses of dark stone, clustering together on the slopes like swallows' nests, the unpaved streets, the *Mesjid el Haram* or sacred square enclosed by a great wall and a colonnade surmounted by small white domes.

At the corners of this colonnade, four tall white minarets towered toward the sky—minarets from which now a pretty lively rifle-fire was developing. A number of small buildings were scattered about the square; but all were dominated by the black impressive cube of the Ka'aba itself, the *Bayt Allah* or Allah's House.

The Master gave an order. Ferrara, obeying it, brought from his cabin a piece of apparatus the Master had but perfected in the last two days of flight over the Sahara. This the Master took and clamped to the rail.

"Captain Alden," said he, "stand by, at the engine-room 'phone from this gallery, here, to order any necessary adjustments as weights are dropped or raised. Keep the ship at constant altitude as well as position. Major Bohannan and Lieutenant Leclair, are your crews ready for the descent?"

"Yes, sir," the major answered. "*Oui, mon capitaine,*" replied the Frenchman.

"Tools all ready? Machine-guns installed? Yes? Very well. Open the trap, now, swing up the nacelle by the electric crane and winch. Right! Steady!"

The yells of rage and hate from below were all this time increasing in volume and savagery. Quite a pattering of rifle-bullets had developed against the metal body of the lower gallery and—harmlessly glancing—against the fuselage.

Smiling, the Master once more peered over. He seemed, as indeed he was, entirely oblivious to any fear. Too deeply had the Oriental belief of Kismet, of death coming at the appointed hour and no sooner, penetrated his soul, to leave any place there for the perils of chance.

The swarming Haram enclosure presented one of the most extraordinary spectacles ever witnessed by human eyes. The strangeness of the scene, witnessed under the declining sun of that desert land, was heightened by the fact that all these furious Moslems were seen from above. Men cease to appear human, at that angle. They seem to be only heads, from which legs and arms flail out in a grotesque manner.

The haram appeared to have become a vast pool of brown faces and agitated white *ihroms* (pilgrim robes), of weaving brown hands, of gleaming weapons. This pool, roaring to heaven, showed strange, violent currents in flow and refluent ebb of hate.

To descend into that maelstrom of frenzied murder-lust took courage of the highest order. But neither Bohannan nor the Frenchman had even paled. Not one of their men showed any hesitancy whatever.

"Ready, sir," said the major, crisply. "Faith, give the signal and down we go; and we'll either bring back what we're going after, or we'll all come back and report ourselves dead!"

"Just a minute, major," the Master answered. He had opened a small door of the box containing the apparatus he had just clamped to the rail, and had taken out a combination telephone earpiece and receiver. With that at mouth and ear, he leaned over the rail. His lips moved in a whisper inaudible even to those in the lower gallery with him.

An astonishing change, however, swept over the infuriated mob in the Haram and throughout the radiating streets. One would have thought a bolt from heaven had struck the Moslems dumb. The angry tumult died; the vast hush that rose to Nissr was like a blow in the face, so striking was its contrast with the previous uproar. Most of the furious gesticulation ceased, also. All those brown-faced fanatics remained peering upward, silent in a kind of thunderstruck amazement.

CHAPTER XXXI

East Against West

THE major, peering down through the trap, swore luridly. Leclair muttered something to himself, with wrinkled brow. Captain Alden's eyes blinked

strangely, through the holes of the mask. The others stared in frank astonishment

"What the devil, sir—?" began the major; but the chief held up his hand for silence. Again he spoke whisperingly into the strange apparatus. This time a murmur rose to him; a murmur that grew to a confused tumult, that in an angry wave of maledction beat up about Nissr as she hung there over the city with flickering blades.

The Master smiled as he put up the receiver in the little box and closed the door with a snap. Regretfully he shook his head.

"These Arabic gentlemen, *et al*," he remarked, "don't seem agreeably disposed to treat with us on a basis of exchanging the Sheik Abd el Rahman for what we want from them. My few remarks in Arabic, via this etheric megaphone, seem to have met a rebuff. Every man in the Haram, the minarets, the arcade and the radiating streets heard every word I said, gentlemen, as plainly as if I had spoken directly into his ear. Yet no sound at all developed here.

"The principle is parallel to that of an artillery shell that only bursts when it strikes, and might be extremely useful in warfare, if properly developed—as I haven't had time, yet, to develop it. No matter about that, though. My proposal has been rejected. Peace having been declined, we have no alternative but to use other means. There is positively no way of coming to an agreement with our Moslem friends, below."

As if to corroborate his statement, a rifle-bullet whistled through the open trap and flattened itself against the metal underbody of the fuselage, over their heads. It fell almost at "Captain Alden's" feet. She picked it up, and pocketed it.

"My first bit of Arabia," said she. "Worth keeping."

The firing, below, had now become more general than ever. Shrill cries rose to Allah for the destruction of these infidel flying dogs. The Master paid no more heed to them than to the buzzing of so many bees.

"I think, major," said he, "we shall have to use one of the two kappa-ray bombs on these Arabic gentry. It's rather too bad we haven't more of them, and that the capsules are all gone."

"Pardon me, my captain," put in Leclair, "but the paralysis-vibrations, eh? As you did to me, why not to them?"

"Impossible. The way we're crippled, now, I haven't the equipment. But I shall nevertheless be able to show you something, Lieutenant. Major, will you kindly drop one of the kappa-rays?"

He gestured at the two singular-looking objects that stood on the metal floor of the lower gallery, about six feet from the trap. Cubical objects they were, about five inches on the edge, each enclosed in what seemed a tough, black, leather-like substance netted with stout white cords that were woven together into a handle at the top.

Strong as Bohannan was, his face grew red, with swollen viens in forehead and neck, as he tried to lift this small object. Nothing in the way of any known substance could possibly have weighed so much; not even solid lead or gold.

"Faith!" grunted the major. "What the devil? These two little metal boxes didn't weigh a pound apiece when —ugh!—when we packed 'em in our bags. How about it, chief?"

The Master smiled with amusement.

"They weren't magnetized then, major," he answered. "Shall I have some one help you?"

"No, by God! I'll either lift this thing or die, right here!" the Celt panted, redder still. But he did not lift the little cube. The best he could do was drag it, against mighty resistance, to the edge of the trap; and with a last, mighty heave, project it into space.

As it left the trap, Nissr rocked and swayed, showing how great a weight had been let drop. Down sped the little, netted cube, whirling in the sunlight. Its speed was almost that of a rifle-ball—so far in excess of anything that could have been produced by gravitation as to suggest that some strange, magnetic force was hurling it earthward, like a metal-filing toward an electro-magnet. It dwindled to nothing, in a second, and vanished.

All peered over the rail, eager with anticipation. No explosion followed, but the most astonishing thing happened. All at once, without any preliminary disturbance, the ground became white. A perfect silence fell on the Haram and the city for perhaps half a mile on all sides of the secret enclosure. Haram and streets, roof-tops, squares all looked as if suddenly covered with deep snow.

This whiteness, however, was not snow, but was produced by the *ihram* robes of the pilgrims now coming wholly to view. Instead of gazing down on the heads of the multitude—all bare heads, as the Prophet commands for pilgrims—the legionaries now found themselves looking at their whole bodies. Every pilgrim in sight had instantaneously fallen to the earth, on the gravel of the Haram, along the raised walks from the porticoes to the Ka'aba, on the marble tiling about the Ka'aba itself, to the last visible streets.

The white-clad figures lay piled on each other in grotesque attitudes and heaps. Even the stone tank at the north-west side of the Ka'aba, under the famous *myzab* or golden water-spout on the Ka'aba roof, was heaped full of them; and all round the sacred Zem Zem well they lay in silent windrows, reaped down by some silent, invisible force.

"You have fifteen minutes," the Master said, "before the paralyzing shock of that silent detonation—that noiseless release of molecular energies which does not kill nor yet destroy consciousness in the least—will pass away. So—"

"You mean to tell me, my captain, *those pilgrims are still conscious?*" demanded Leclair, amazed.

"Perfectly. They will see, hear and know all you do. I wish them to. The effect will be salutary, later. But they cannot move or interfere. All you have to look out for is the in-coming swarm of fanatics already on the move. So there is no time to be lost. Into the nacelle, and down with you!"

"But if they try to rush us you can drop the other bomb, can't you?" demanded the major, as they all clambered into the nacelle.

The Master smiled, as he laid his hands on top of the basket and cast his eyes over the equipment there, noting that machine-guns, pick-axes, crowbars and all were in position.

"The idea does you credit, major," said he. "The fact that the other bomb would of course completely paralyze you and your men, here, is of course quite immaterial. Let us have no more discussion, please. Only fourteen minutes, thirty seconds now remain before the *Hujjaj* will begin to recover their muscular control. You have your work cut out for you, the next quarter-hour!"

The Master raised his hand in signal to Grison, at the electric winch. A turn of a lever, and the nacelle

rose from the metals of the lower gallery. It swung over the trap and was steadied there, a moment, by many hands.

"Lower away!" commanded the chief, sharply.

Smoothly the winch released the fine steel cable, with a purring sound. Down shot the nacelle, steadily, swiftly, with the major, Leclair and the crew now engaged in the most perilous, dare-devil undertaking imaginable.

Down, swiftly down, to raid the *Bayt Allah,* the sacred Ka'aba, holy of holies to more than two hundred million Moslem fanatics, each of whom would with joy have died to keep the hand of the unbelieving dog from so much as touching that hoar structure or the earth of the inviolate Haram.

Down, swiftly down with picks and crowbars. Down, into the midst of all that paralyzed but still conscious hate, to the very place of the supremely sacred Black Stone, itself.

CHAPTER XXXII
The Battle of the Haram

THE raiding-party, beside its two leaders, consisted of Lombardo, Rennes, Emilio, Wallace, and three others, including Lebon. The lieutenant's orderly, now having recovered strength, had pleaded so hard for an opportunity to avenge himself on the hated Moslems that Leclair had taken him.

As for Lombardo, he had downright insisted on going. His life, he knew, was already forfeited to the expedition—by reason of his having let the stowaway escape—and, this being so, he had begged and been granted the favor of risking it in this perilous undertaking.

Such was the party now swiftly dropping toward the Haram where never yet in the history of the world two English-speaking men had at one time gathered; where never yet the speech of the heretic had been heard; where so many intruders had been beheaded or crucified for having dared profane the ground sacred to Allah and his Prophet.

To the major, peering over the side of the nacelle, it seemed as if the Haram—central spot of pilgrimage and fanatic devotion for one-seventh of the human race—were leaping up to meet him. With dizzying rapidity the broad square, the grim black Ka'aba, the prostrate white throngs all sprang up at the basket. Fascinated, the major watched; his eyes, above all, sought the mysterious Ka'aba. Excitement thrilled his romantic soul at the thought that he was one of the very first white men in the world ever to behold that strange, ancient building.

Clearly he could see the stone slabs cemented with gypsum, the few stricken pigeons lying there, the cords holding the huge *kiswah* or brocaded cloth covering "Mecca's bride" (the Ka'aba). The golden waterspout was plainly visible, gleaming in the sun—a massive trough of pure metal, its value quite incalculable..

Now the Ka'aba was close; now the nacelle slowed, beside it, in the shadow of its grim blackness. The major got an impression of exceeding richness from the shrouding veil, which he saw to be a huge silken fabric, with a two-foot band a little more than halfway up, the whole covered with verses from the Koran worked in gold.

The nacelle sank gently on to a heap of motionless pilgrims, canted to the left, and came to rest. Not a groan, curse or even a sigh escaped the desecrated Moslems forever defiled by the touch of the infidels' accursed machine.

The effect was horribly uncanny—of all those brown men, open-eyed and conscious, but perfectly unable to move so much as an eyebrow. Such as had fallen with their eyes in the direction of the nacelle, could see what was going on; the others could only judge of this incredible desecration by what they could hear. The sound of foreign voices, speaking an unbelievers' tongue in the very shadow of the Ka'aba must have been supremely horrible to every Mohammedan there.

"Out, men, and at it!" the major commanded, as he scrambled from the nacelle, slid and stumbled over the Moslems, and reached hands for the tools passed out to him. Leclair followed. Men and tools were swiftly unloaded, leaving only Wallace and Emilio at their guns, as agreed.

"Faith, but this is some proposition!" grunted the major, as the seven men trampled over the prostrate bodies, without any delay whatever to peer at the Haram or the Ka'aba. "The stone's there, men, at the southeast corner! Get busy!"

No exhortation was necessary. Every man, nerved to the utmost energy by the extreme urgency of the situation, leaped to work. And a strange scene began, the strangest in all the history of that unknown city of mysteries. The little troop of white men in uniform stumbled over the bodies and faces of their enemies along the Ka'aba, past the little door about seven feet from the ground, and so, skirting the slanting white base, two feet high, came to the *Hajar el Aswad,* or Black Stone, itself.

Above, in the burning Arabian sky, the airliner hovered like a gigantic bird of prey, her gallery-rails lined with motionless watchers. The Master observed every move through powerful glasses. Over his ears a telephone headpiece, which he had slipped on, kept him in close touch with the men in the nacelle, via the steel cable. This cable formed a strand between East and West; if any evil chance should break it, life would end there and then for nine members of the Legion, brave men all.

That time was short, indeed, was proved by the vague, hollow roar already drifting in from the outskirts of the city, and from the plain whence, crowding, struggling into the city's narrow way, a raging mass of pilgrims was already on the move. A tidal-wave, a sea of hate, the hundred thousand or more Hujjaj as yet untouched by the strong magic of the Feringhi, were fighting their way toward the Haram.

The time of respite was measured but by minutes. Each minute, every second, bore supreme value.

"There she is, men!" the major shouted, pointing. And on the instant, driving furiously with pick-axe, he struck the first blow.

Plainly, about three feet below the bottom of the silken veil and four feet above the pavement, there indeed they saw the inestimably sacred stone, which every Moslem believes once formed a part of Paradise and was given by Allah to the first man. To the legionaries' excited eyes it seemed to be an irregular oval, perhaps seven inches in diameter, with an undulating surface composed of about a dozen smaller stones joined by cement and worn blackly smooth by millions of touches and kisses.

It was surrounded by a border of cement that looked like pitch and gravel; and the major noted, even as he drove his pick into this cement, that both the stone and the border were enclosed by a massive circle of gold with the lower part studded full of silver nails.

Impervious to Fear

ONLY these hasty observations, and no more, the legionaries made as they fell with furious energy to the task of dislodging the venerable relic. To all but this labor they were oblivious—to the heat and stifle of that sun-baked square, the mute staring of the paralyzed Hujjaj, the wafting languor of incenses from the colonnades, the quiet murmur of waters from the holy well of Zem Zem.

The scene, which ordinarily would have entranced them and filled them with awe, now had become as nothing. Every energy, every sense had centered itself only on this one vital work of extracting the Black Stone from the Ka'aba wall and of making a swift getaway with it before the rising murmur of rage, from without the area of paralysis, should sweep in on them with annihilating passion.

"Here, Emilio—drive your pick here!" commanded the major, his red face now dark crimson with heat and excitement as well as with the intense force wherewith he was wielding his implement. Cement flew in showers at every stroke, out over the sweating legionaries and the prostrate Moslems near the Stone. The white men slid and stumbled on limp bodies, trampled them unheedingly, and from the outstretched pilgrims made as it were a kind of vantage-post for the attack on the inmost citadel of Islam.

"Work quick, major!" came the Master's voice, seemingly at Bohannan's elbow. "There's a fearful drove of the rascals coming. You'd better get that stone out and away in double-quick time!"

The major replied nothing, but his pickaxe flailed into the cement with desperate energy. Emilio and others seconded him, while Rennes and Wallace dug, kneeling, with their crowbars. The blows echoed with staccato rapidity through the sacred Haram, which now had begun to fill with the confused roar of the on-coming mobs from the Ma'abidah suburb and the Plain of Mina, from Jebel Hindi and the Sulaymaniyah quarter.

"You have about five minutes more," the Master spoke again. "If necessary, we will open on them with machine-guns, from the ship, but I'd like to avoid bloodshed if possible. Do the best you can!"

Bohannan had no breath for answering. Every ounce of energy of all seven men was being flung into that mad labor. Sweat streamed into their eyes, half-blinding them; they dashed it off, and struck again and again. The cement crumbled and gave; the heavy gold band commenced to bend; Rennes got his crowbar into an advantageous leverage and gave a might heave.

The stone seemed to cry aloud, with a dry, harsh screaming sound of outraged agony, as it yielded. It was only the sundering of the mortar, of course; but a chill ran up the major's spine, and goose-flesh prickled all over him. Furiously the legionaries worked the stone back and forth; a shower of mortar fell on the workers' feet and on the upturned, staring faces of the paralyzed Moslems trampled by the horrible contamination of heretical boots—perhaps even pigskin boots!—and then, all at once, the *Hajar el Aswad* slid from the place where it had lain uncounted centuries.

Cursing with frantic excitement, the legionaries tugged it from the wall, together with its golden band. Above them the *kiswat* curtain bellied outward, swaying in the breeze. No Moslem has ever admitted that the Ka'aba veil is ever moved by any other thing than the wings of angels. Those of the Faithful who now beheld that movement, felt the avenging messengers of Allah were near, indeed; and a thousand unspoken prayers flamed aloft:

"Angels of death, Azraël and his host, smite these outcasts of Feringhistan!"

The prayers seemed more likely of fulfilment from the hands of the oncoming hordes already streaming into the converging streets to the Haram. As the stone came clear, into the hands of the invaders, a dank, chill blast of air blew from the aperture against the white men's faces. It seemed to issue as from a cavern; and with it came a low, groaning sound, as of a soul in torment.

A shadow fell across the Haram; the light of the sun was dulled. The sudden crack of a rifle-shot snapped from the arcade, and a puff of rock-dust flew from the corner of the Ka'aba, not two feet from the major's head.

"Come on, men!" cried the major. "Away!"

Some latent mysticism had been stirred in him; some vague, half-sensed superstition. Nothing more natural that that a cold draught should have soughed from the pent interior of the temple, or that the airliner, slowly turning as she hung above the Haram, should with her vast planes have for a moment thrown her shadow over the square. But the Celt's imaginative nature quivered as he gripped the stone.

"You, quick, on the other end!" he cried to Emilio. "You, Lombardo, steady her! So! Now—to the nacelle!"

The rifles were opening a lively ball, already, as the men staggered over the prostrate Moslems, reached the nacelle and with a grunt and a heave tumbled the *Hajar el Aswad* into it. They scrambled after, falling into the shelter of the basket.

Into the arcade, at the northeast corner and halfway along the western side, two furious swarms of white-robed Hujjaj were already debouching, yelling like fiends, firing as they came. The uproar swelled rapidly, in a swift-rising tide. The Haram grew all a confusion of wild-waving arms, streaming robes, running men who stumbled over the paralyzed forms of their coreligionists. Knives, spears, scimitars, rifles glinted in the sun.

The whine and patter of bullets filled the air, punctured the *kiswat* veil, slogged against the Ka'aba. Lebon and Rennes, turning loose the machine-guns, mowed into the white of the pack; but still they came crowding on and on, frenzied, impervious to fear.

"Haul Up"

UP rose the nacelle, as the major wildly shouted into the phone. It soared some forty feet in air, up past the black silken curtain, then unaccountably stopped, level with the Ka'aba roof.

"Up! Up!" yelled Bohannan, frantically. The spud of bullets against the steel basket tingled the bodies of the men crouching against the metalwork.

All at once Dr. Lombardo stood up, pickaxe in hand, fully exposed to rifle-fire.

"Down, you blazing idiot!" commanded the major, dragging at him with hands that shook. The doctor thrust him away, and turned toward the Ka'aba, the roof of which was not three feet distant.

"The golden spout—see?" he cried, pointing. "*Dio mio*, what a treasure!" On to the edge of the nacelle he clambered.

"Don't be a damn fool, doctor!" the major shouted; but already Lombardo had leaped. Pick in hand, he jumped, landing on the flat roof of the temple.

Ferocious howls and execrations swelled into a

screaming chorus of hate, of rage. Unmindful, the Italian was already frantically attacking the *myzab*. Blow after blow he rained upon it with the sharp, cutting edge of the pick, that at every stroke sank deep into the massive gold, shearing it in deep gashes.

A perfect hail of rifle-fire riddled the air all about him, but still he labored with sweat streaming down his face all blackened with dirt and cement. From Nissr, far above, cries and shouts rang down at him, mingled with the sharp spitting of the machine-guns from the lower gallery. The guns in the nacelle, too, were chattering; the Haram filled itself with a wild turmoil; the scene beggared any attempt at description, there under the blistering ardor of the Arabian sun.

All at once Dr. Lombardo inserted the blade of the pick under the golden spout, pried hard, bent it upward. He stamped it down again with his boot-heel, dropped the pick and grappled it with both straining hands. By main force he wrenched it up almost at right angles. He gave another pull, snapped it short off, dragged it to the parapet of the Ka'aba, and with a frantic effort swung it, hurled it into the nacelle.

Down sank the basket, a little, under this new weight. The doctor leaped, jumped short, caught the edge of the basket and was just pulling himself up when a slug caught him at the base of the brain.

His hold relaxed; but the major had him by the wrists. Into the nacelle he dragged the dying man.

"For the love o' God, *haul up!*" he shouted.

The basket leaped aloft, as the winch—that had been jammed by a trivial accident to the control—took hold of the steel cable. Up it soared, still pursued by dwindling screams of rage, by now futile rifle-fire. Before it had reached the trap in the lower gallery, the main propellors had begun to whicker into swift revolution, all gleaming in the afternoon sun. The gigantic shadow of the Eagle of the Sky began to slide athwart the hill-side streets to southeastward of the Haram; and so, away.

Up came the nacelle through the trap. The davit swung it to one side; the trap was slammed down and bolted. Out of the nacelle tumbled the major, pale as he had formerly been red, his face all drawn with grief and pain.

"The damned Moslem swine!" he panted. "Faith, but they—they've killed him!" He flung a passionate hand at the basket, in which, prone across the golden spout, the still body of Lombardo was lying. "They've killed as brave a man—"

"We all saw what he did, major," the chief said quietly. "Dr. Lombardo owed us all a debt, and he has paid it. This is Kismet! Control yourself, major. The price of such brave adventure—is often death."

They lifted out the limp form, and carried it away to the cabin the living man had occupied, there to wait some opportune time for burial in the desert. Mecca, in the meanwhile, was already fading away to northwestward. The heat-shimmer of that baked land of bare-ribbed rock and naked igneous hills had already begun to blur its outlines. The white minarets round the Haram still with delicate tracery as of carved ivory stood up against the sky; but of the outraged people, the colonnades, the despoiled and violated Ka'aba, nothing could any more be seen.

Southward by eastward sped Nissr; and with her now was departing the soul of Islam. In her keeping lay three things more sacred than all else to Mohammedan hearts—Kaukab el Durri, the Great Pearl Star; Hajar el Aswad, the Black Stone; and Myzab, the Golden Waterspout.

Awed, silenced, the legionaries stood there in the lower gallery, peering into the blood-stained nacelle. Hard-bitten men, all, and used to the ways and usages of war; yet factors were present in this latest exploit that sobered and steadied them as never before.

The Master, still unmoved, merely smiled a peculiar smile as he commanded:

"Major, have the stone and the golden spout carried to my cabin. And, if you please, no remarks!"

Bohannan picked a few men to fulfil the order. Then he asked and received permission to retire to the smoke-room, for a pipe and a quiet half hour after having washed the dust and grime of battle from his hands and face. The major's Celtic nerves needed tobacco and reflection as they had rarely needed them.

The Master, climbing up the ladder to the main gallery, left Leclair and a few off-duty men in the lower one. Two or three approached the French ace, to hold speech with him about the exploit at the Ka'aba, but he withdrew from them to the extreme rear end of the gallery and remained for a long time in silent contemplation of the fading city, the Plain of Mina and Mount Ararat, beyond.

As the vague purple haze of late afternoon deepened to veils that began to hide even the outlines of the mountain, he leaned both elbows on the rail and in his own language whispered:

"Nom de Dieu! The Pearl Star—the Golden Waterspout—the sacred Black Stone!" His face was white with pride and a fire of eagerness that burned within. "Why, now we're masters of all Islam—masters of the treasure-houses of the Orient!

"Mais—nom de Dieu!"

CHAPTER XXXIII
The Ordeal of Rrissa

ALONE in his cabin with the waterspout of massive gold and with the sacred Black Stone, the Master sat down in front of the table where they had been laid, took a few leaves of khat, and with profound attention began to study the treasures his bold coup had so successfully delivered into his hands.

The waterspout, he saw at once, would as a mere object of precious metal be worth a tremendous sum. It was of massive gold, apparently unalloyed—as befitted its office of carrying the water from the roof of the Ka'aba and throwing it upon Ishmael's grave, where pilgrims have for centuries stood fighting to catch it. Its color verged on reddish; all its lateral surfaces were carved with elaborate arabesques and texts from the Koran. The bottom bore an inscription in Tumar characters, easily decipherable by the Master, stating that it had been sent from Constantinople in the year of the Hegira 981, by Shafei Hanbaly the Magnificent.

"A great treasure," pondered the Master. "An almost incalculable treasure, in itself; but less so, intrinsically, than as an object of Moslem veneration. In either case, however, enormously valuable."

He examined it a moment or two longer, noting with care the gashes and deep cuts made by the frantic strokes of Dr. Lombardo's pick-ax. What his thoughts might have been regarding the doctor's tragic death, none could have told. For with a face quite unmoved, he turned now to the examination of the world-famous Black Stone.

This object, he saw, possessed no value whatever, *per se*. Aside from its golden encircling hand studded with silver nails, its worth seemed practically nothing. As

it lay on the table before him, he realized that it was nothing but a common aerolite, with the appearance of black slag. Its glossy, pitchlike surface, on the end that had been exposed from the wall, was all worn and polished smooth by innumerable caresses from Moslem hands and lips.

"Very hygienic," the Master thought. "If there was ever a finer way devised for spreading the plague and other Oriental diseases, I can't very well imagine what it could be!"

A bit of the stone had been broken off by Leclair's crowbar. The Master's trained, scientific eye saw, by the bright-sparkling, grayish section of the break, that iron and nickel formed the chief elements of the stone. Its dimensions, though its irregular form made these hard to come by, seemed about two and a half feet in length, by about seven or eight inches in breadth and thickness. Its weight, as the Master stood up and lifted it, must have been about two hundred pounds. No doubt one man could have carried it from its place in the Ka'aba to the nacelle; but in the excitement of battle, and impeded by having to stumble over prostrate Moslems, the major had considered it advisable to ask for some help.

"Mineralogically speaking, this is a meteor or a block of volcanic basalt," judged the Master. "It seems sprinkled with small crystals with rhombs of tile-red feldspath on a dark background like velvet or charcoal, except for one reddish protuberance of an unknown substance. A good blow with a hammer would surely break it along the original lines of fracture—and this is well worth knowing and remembering.

"Well, so far so good," he concluded. The Air Control Board hasn't got us, yet. Neither have the Mohammedans. True, we've lost a number of men, but that was to have been expected. That's inevitable, and we still have enough. I hardly see that we have so very much to complain of, so far."

He turned, pulled a blanket from his berth and carefully spread it over the loot on the table. Then he pushed the button communicating with the cabin wherein Rrisa was still quivering as a result of having heard the fusillades and tumult—unseen though they had been to him—at Mecca.

In a couple of minutes the faithful orderly appeared, salaamed and stood waiting with a drawn, troubled face.

"Allah m'a!" the Master greeted him, in Allah's name inquiring for his good health. "I have something important to ask thee. Come in. Come in, and close the door."

He spoke in Arabic. The orderly, in the same tongue, made answer as he obeyed:

"The Master has but to talk, and it is answered, if my knowledge can suffice." His words were submissive; but the expression was strange in his eyes, at sight of the blanket on the table. That blanket might hide—what might it not hide? The light in his gaze became one the Master had never yet seen there, not even in the sternest fighting at Gallipoli.

"Mecca lies behind us, Rrisa," the Master began. "Thou hast seen nothing of it, or of what happened there?"

"Nothing, *m'almé*. I was bidden remain in my cabin, and the Master's word is always my law. It is true that I heard sounds of a great fighting, but I obeyed the Master. I saw nothing. The Sheik Abd el Hareth, did you deliver him into the hands of the Faithful?"

"No, Rrisa. They refuse to accept him. And now I have other plans for him. It is well that thou didst see nothing, for it was a mighty fighting and there was death both to them and to us. Now, my questions to thee."

"Yes, master."

"Tell me this thing, first. Is it indeed true speaking, as I have heard, that the Caliph El Walid the First, in Hegira 88, sent to Mecca an immense present of gold and silver, forty camel-loads of small cut gems and a hundred thousand *miskals* in gold coin?"

"It is true, Master. Save that he sent more; nearly two thousand *miskals*. He also sent eighty Coptic and Greek artists to carve and gild the mosques.

"I Obey"

"ONE Greek sculptured a hog on the Mosque of Omar, trying to make it into a *kanisah* (unclean idol-house.) My people discovered the sacrilege, and"—he added with intent—"gave that Greek the bowstring, then quartered the body and threw it to the vultures."

"That is of no importance whatever, Rrisa," answered the Master with an odd smile. "What thy people do to the unbeliever, if they capture him, is nothing to me. For—dost thou see?—they must first make the capture. What I would most like to know is this: where is all that treasure, now?"

"I cannot tell you, master."

"At Mecca?"

"No, master, not at Mecca."

"Then where?"

"M'almé! My lips are sealed as the Forbidden Books!"

"Not against the commands of thy sheik—and I am thy sheik!"

Rrisa's lips twitched. The inner struggle of his soul reflected itself in his lean, brown face. At last he aroused himself to make answer:

"The treasure, Master, is far to the south-east—in another city."

"Ah! So there *is* another city far out in the Ruba el Khali, the Empty Abodes!"

"Yes, master, that is so."

"Then the ancient rumor is true? And it is from near that city that thou didst come, eh? By Allah's power, I command thee to tell me of this hidden city of the central deserts!"

"This thing I cannot do, my sheik."

"This thing thou must do!"

"Oh, my master! It is the secret of all secrets! Spare me this!"

"No, Rrisa, thou must obey. Far inside El Hejaz (the barrier), that city is lying for my eyes to behold. I must know of it. Thy oath to me cannot be broken. Speak, thou!"

The Master made no gesture with his hands, did not frown or clench his fists, but remained impassively calm. His words, however, cut Rrisa like knives. The orderly remained trembling and sweating, with a piteous expression. Finally he managed to stammer:

"Master, in our tongue we have a proverb: 'There are two things colder than ice—a young old man and an old young man. There is still a colder thing—the soul that betrays the Hidden City!'"

"Speak Rrisa! There is no escape for thee!"

"My sheik, I obey," quavered the unfortunate orderly, shaken with a palsy of fear. Without a quiver, the Arab could rush a machine-gun position or face a bayonet-charge; but this betrayal of his kin struck at the vitals of his faith. Still, the Master's word was law even above Al Koran. With trembling lips he made

answer:

"This city—spare me uttering its name, master!—lies many hours' journey, even by this swift Eagle of the Air, beyond the Iron Mountains that no man of the Feringhi has ever seen. It lies beyond the Great Sand Barrier, in a valley of the Inner Mountains; yes, at the very heart of the Ruba el Khali."

"I hear thee, Rrisa. Speak further. And let thy speaking be truth!"

"It shall be truth, by the Prophet's beard! What does the Master ask of me?"

"Is it a large city, Rrisa?"

"Very large."

"And beautiful?"

"As the Jebel Radhwa!" (the mountain of Paradise).

"Thou has been in that secret city, Rrisa?"

"Once, my master. The sight still remains in my eyes."

"And, seeing the Iron Mountains again, thou couldst guide us thither?"

"Allah forbid! That is among the black deeds, master! 'The grave is darkness and goods deeds are its lamps; but for the betrayer, there shall be no light!' *Wallah, Effendi!* Do not make me thy guide!"

"I have not said I intended to do so, Rrisa. I merely asked thee if thou *couldst!*" The Master's voice was silken, fine, penetrant. "Well, Rrisa, tell me if thou couldst!"

"Yes, Master. *Ya gharati!* (oh my calamity!) It is true I could." The words issued from his unwilling throat as if torn out by main force. "But I earnestly beg of you, my sheik, do not make me do this thing!"

"Rrisa, if I command, thou must obey me! There is only one thing can ever loose the bonds I have knotted about thee."

"And that is certainty, master?" (i.e. death).

"That is certainty! But this, to the oath-breaker and the abuser of the salt, means a place among the *mujrim*, the sinful. It means Jehannum, and an unhappy couch shall it be!"

Rrisa's face grew even more drawn and lined. A trembling had possessed his whole body.

"Master, I obey!" he made submission, then stood waiting with downcast eyes of suffering.

"It is well," said the chief, rising. He stood for a moment peering at Rrisa, while the hum and roar of the great airliner's mechanism, the dip and sway of its vast body through the upper air, seemed to add a kind of oppressive solemnity to the tense situation. To the cabin wall the Master turned. There hung a large-scale map of the Arabian peninsula. He laid a hand on the vast, blank interior, and nodded for Rrisa to approach.

"Listen, thou," said he. "Thy knowledge is sufficient. Thou dost understand the interpretation of maps, and canst read latitude and longitude. Mark here the place of the hidden city!"

"Of the Bara Jannati Shar, master? Ah no, *no!*"

"So then, that is its name?" the chief demanded, smiling.

"No, master. Thou dost know the Arabic. Thou dost understand this means only, in thy tongue, the Very Heavenly City."

"True. Well, let it pass. Very Heavenly City it shall be, till the real name becomes known. Come now, mark the place of the hidden city and mark it truly, or the greatest of sins will lie upon thy soul!"

The Arab advanced a brown, quivering hand.

"Give me a pencil, master and I obey!" said he, in a voice hardly audible.

CHAPTER XXXIV
The Inner Secret of Islam

THE chief handed him a pencil, Rrisa intelligently studied the map for nearly two minutes, then raised his hand and made a dot a few miles northeast of the intersection of 50° East and 20° North. The Master's eye was not slow to note that the designated location formed one point of a perfect equilateral triangle, the other points of which were Bab el Mandeb on the south and Mecca on the north.

"There, *m'almé,*" whispered the Arab, in a choking voice. "Now I have told you the secret of all secrets, and have lost my soul. I have revealed the inner mystery of Islam, that to this day no man of the Feringhi has ever known. I am a very great man of sin, and should have first torn out my tongue.

"But my life is in your hands, master, and I have shared your salt. Allah knows I was forced to speak. *Shal'lah!* (It is Allah's will.) Allah will weigh my heart and will forgive, for he is the Compassionate, the Merciful! I beg you, master, now let me go!"

"Soon, Rrisa," the chief answered, turning away from the map. "But first there is something I must show thee."

"And what may that be, my sheik?" the Arab queried, his widening eyes fixed on the blanket that covered the loot from Mecca. Instinctively he sensed that some horrible sight was about to be presented to him. His face paled even more. He licked dry lips with a tongue equally dry, and leaned against the table to steady himself. "What have you now to show me, oh my master?"

"Listen!" the chief commanded sternly. "The Meccans are a people corrupt and accursed. 'Their hearts are black as their skins are white.' They live by fleecing the Hujjaj, by making sale and barter of relics. by turning the holy places into marts of trade. All that is well known throughout Islam. Ah, the degenerate breed of the sons of the Prophet!"

"That is true, my master. And what then?"

"Is it not a fact that they could not even safeguard the Kaukab el Durri from the hand of the Great Apostate Sheik? How much less, then, could they protect their other and more sacred things, if some Shiah dog should come to rob them of the things they value?

"Would it not be better that such things should be carried far from danger, to the hidden, inner City? I ask thee this, Rrisa; would it not be better far?"

"And what is the meaning of my master's strange words?" ventured Rrisa, a sort of dazed horror dawning in his eyes. "The other and more sacred things of Islam—are they there under that cloth, oh *m'almé?*"

"Thou hast said it, Rrisa! Now, behold them!"

With a quick, dramatic gesture, well-calculated to strike at the roots of the superstitious Arab's nature, he flung away the blanket. To Rrisa's horrified gaze appeared the Myzab and the sacred Black Stone.

"Ya Allah!" gulped the orderly, in a choking whisper. His face became a dull gray. His eyes, rimmed with white, stared in terror. His teeth began to chatter; and on his forehead appeared little glistening drops.

"Oh, master, that is not—?"

"Truly, yea! The Golden Waterspout, Rrisa, and the Black Stone itself! I am carrying them to the Very Heavenly City, far in the Iron Mountains! They shall be given to the Great Olema, there, who is more

fit to guard and keep them than the Sherif of Mecca or than his sons Feisal and the two Alis. No harm shall befall them, and—"

"And your hand—the hands of other Feringhi who are not my masters—have touched these things?" stammered Rrisa. "Oh my calamity, oh my grief!"

"Thou canst go now, Rrisa," the Master said. "Go, and think well of what I have told thee, and—"

But Rrisa, falling prone to the metal of the cabin floor, facing the Black Stone, gave vent to his feelings and burst into a wild cry of *"Al Illaha—"* and the rest of the immemorial formula.

The Master smiled down at him, quizzical and amused yet still more than a little affected by the terror and devotion of his orderly. Wise, he waited till Rrisa had made the compulsory prayers of Labbayk, Takbir and Tahlil, as all Moslems must do when coming near the Black Stone. Then, as the orderly's voice suddenly died away, he bent and laid a hand on the quivering Arab's shoulder.

"Come, come, Rrisa," said he, not unkindly. "Be thou not so distressed. Is it not better that these very precious things be kept in greater safety at the Jannati Shahr? Come, Rrisa! Arise!"

The orderly made no move, uttered no sound. The Master dragged him up, held him, peered into his face that had gone quite ashen under its brown.

"Why, Lord! the man has fainted dead away!" exclaimed the Master. He gathered Rrisa in his powerful arms, carried him to his own cabin and laid him in the berth, there; then he bathed his face with water and chafed his hands and throat.

In a few minutes, Rrisa's eyes vaguely opened. He gulped, gasped, made shift to speak a few feeble words.

"Master!" he whispered.

"Well, what dost thou wish?"

"One favor, only!"

"And what is that?"

"Leave me, a little while. I must be alone, all alone with Allah—to think!"

The Master nodded.

"It shall be as thou wishest," said he. "Think, yes. And understand that what I do is best for all of Sunnite Islam! As for the Shiah dogs, what hast thou to trouble about them?"

Saying no more, he withdrew to his own cabin, wrapped the Myzab and the Stone in the blanket and laid them carefully under his berth. Opening his desk drawer, he assured himself the Pearl Star was still there. This done, he turned again to the map, carefully studied the location of the point Rrisa had designated, and—going to the pilot-house—gave directions for a new course to "Captain Alden," now at the wheel.

This course, he calculated by allowing for wind and lateral drift, would carry Nissr directly toward the site of the still half-mythical Iron Mountains and the Bara Jannati Shahr.

He now returned to his cabin, locked himself in and—pondering over a few khat-leaves—passed the remainder of the afternoon sunk in deep abstraction.

Evening and night still found him in profound thought, while the giant airliner steadily rushed into the southeast, bearing him and the Legion onward toward dim regions now veiled in purple darkness under strange stars.

At nine o'clock he ordered Nissr stopped, and had the body of Dr. Lombardo sent down with six men in the nacelle, for burial. No purpose could be served by keeping the body, and all unnecessary complications had to be dispensed with before the morrow. Lombardo, who had fully atoned for his fault by having given his life in the service of the now depleted Legion, was buried in his service-uniform, in a fairly deep grave on which the legionaries heaped a great tumulus of sand. The only witnesses were the Arabian Desert stars; the only requiem the droning of the helicopters far above, where Nissr hung with her gleaming lights like other, nearer stars in the dense black sky.

By ten o'clock, the airliner had resumed her course, leaving still another brave man to his last sleep, alone. The routine of travel settled down again on the ship and its crew of adventurers.

At half-past eleven, the Master issued from his cabin. All alone, and speaking with no man, he took a quarter-hour constitutional up and down the narrow gallery along the side of the fuselage—the gallery on which his cabin-window opened. His face, by the vague light of the glows in this gallery, looked pale and worn; but a certain gleam of triumph and proud joy was visible in his dark eyes.

All about him, stretched night unbroken. Far behind, lay vast confusions involving hundreds of millions of human beings violently wrenched from their accustomed routines of faith and prayer, with potential effects beyond all calculation. Ahead lay—what?

"It may be glory and power, wealth past reckoning, incredible splendor," thought the Master, "and it may be ignominy, torture, death. 'Allah knows best and time will show.' But whatever it may be—is it completion? The human heart, alone—can that ever be complete in this world?"

The Shadow in the Gloom

HE bent at the rail, peering far out into the vague emptiness through which the airliner was pushing.

"Come what may," he murmured, "for to-night, at any rate, it is peace. 'It is peace, till the rising of the dawn!'"

In a strange mood, still holding no converse with any man, he returned to the main corridor and went toward his cabin. His way led past the door of "Captain Alden." There he paused a moment, all alone in the corridor. The lights in the ceiling showed a strange look in his eyes. His face softened, as he laid a hand on the metal panels of the door, silently almost caressingly.

To himself he whispered:

"I wonder who she really is? What can her name be—who can she be, and—and—?"

He checked himself, impatiently:

"What thoughts are these? What nonsense? Such things are not for me!"

Silently he returned to his cabin, undressed, switched off the light and turned into his berth, under which lay the incalculable treasures of Islam. For a long time he lay there, thinking, wondering, angry with himself for having seemed to give way for a single moment to softer thoughts than those of conquest and adventure.

Gradually the cradling swing, the quivering power of the airship, lulled his fevered spirit. Sleep won upon him, dulled the excitements of the past twenty-four hours, sank him into oblivion. His deep, regular breathing sounded in the gloom of the cabin that contained the Great Pearl Star, the Myzab, the sacred Black Stone of infinite veneration.

An hour he slept. On, on roared Nissr, swaying, rising, falling a little as she hurled herself through the Arabian night toward the unknown Bara Jannati

Shahr, hidden behind the Iron Mountains of mystery as yet unseen by any unbelieving eye.

Peace, all seemed peace, for one dark hour.

But as the hour ended, a shadow fell along the narrow gallery outside the cabin window. A silent shadow it was, that crept, paused, came on again. And now in the dark, had there been an eye to see, the shadow would have been identified as a barefoot man, lithe, alert, moving silently forward with the soundless stealth of an Arab versed in the art of *asar* or man-stalking.

To the Master's window this shadow crept, a half-invisible thing in the gloom. It paused there, listening to the deep, regular breathing within. Then a lean, brown hand was laid on the sill. It still seemed to hesitate.

Something gleamed vaguely in that hand—a crooked *jambiyah* dagger, needle-sharp at the point, keen-edged and balanced for the stroke that silently slays.

Motionless, unbreathing even, the shadow waited a long minute. Then all at once over the sill it writhed, quick, lithe as a starved panther.

Dagger in hand, the shadow slid to the berth where lay the Master of the legionaries. There Rrisa paused, listening to the slow respiration of the White Sheik with whom he had shared the inviolable salt, to whom he owed his life itself.

Up, in the gloom, came the dagger-blade.

Over the unconscious master it poised, keen, cold, avenging in the dark of the cabin where lay the three supreme treasures of all Islam.

CHAPTER XXXV

Into the Valley of Mystery

THE upraised blade, poised for swift murder, did not descend. With a groan from the heart's core, Rrisa let fall his trembling hand, as he recoiled toward the vague patch of starlight that marked the cabin window.

"Bismillah!" he whispered hoarsely. "I cannot! This is my sheik—'and thrice-cursed is the hand that slays the sheik.' I cannot kill him!"

For a moment he remained there, pondering. Swift, passionate thoughts surged through his brain, which burned with fever. In Rrisa's fighting blood the supreme battle of his whole existence was aflame—duty of annihilating the violator of his faith combatting duty of loyalty absolute to one whose salt he had eaten, to one who had preserved his life.

So, in the dark he stood there, a shadow among shadows. He peered about with white-rimmed eyes, striving to discover where now the Myzab and the sacred Black Stone might be. The dim bulk of the blanket under the berth came to his senses. He knelt, touched the blanket, felt the hard solidity within.

Torn with the anguish of a great conflict, he pondered, smearing the sweat of agony from his hard-wrinkled forehead. Better was it to fling these holy things from the cabin window, out into the night? Better the certainty that the desert sands, far below, would inevitably drift over them, forever burying them from the sight of his people; or better the chance that the Master, after all, really intended to deliver them back into the Moslem hands at Bara Jannati Shahr?

"Allah, oh guide thy servant now!" the orderly prayed with trembling lips. "Allah, show thou me the way!"

The Master, stirring in his sleep, sighed deeply and let his hand fall outside the berth. Rrisa, fearful of imminent discovery, made up his mind with simple directness. He salaamed in silence, all but brushing the Master's hand with his lips.

"Wa'salem!" (farewell) he breathed. Then he got up, turned, laid his dagger on the table and slid out through the window as soundlessly as he had come. He crossed the narrow gallery in the gloom, and mounted the rail beyond which yawned black vacancy.

For a moment he stayed there, peering down first at the impenetrable abysses below, then up at the unmoved stars above. The ghostly aura of light in the gallery showed his face wan, deep-graven with lines, agonized, ennobled by strong decisions of self-sacrifice.

"Thou, Allah," he whispered, "dost know life cannot be for both my master and thy servant, after what thy servant has seen. I offer thee my life for his! Thou wilt judge aright, for thou knowest the hearts of men and wilt wrong no man by the weight of a grain of sand. Thou art easy to be reconciled, and merciful! There is no God but Allah, and Mohammed is his Prophet!"

With no further word, he leaped.

Just a fraction of a second, a dim-whirling object plummeted into space. It vanished.

As best he understood, Rrisa had solved his problem and had paid his score.

The Master wakened early, with the late May sun already slanting in from far, dun and orange desert-levels, gilding the metal walls of his cabin. For a few moments he lay there, half-dreamily listening to the deep bass hum of the propellers, the slight give and play of the airliner as she shuddered under the powerful drive of her Norcross-Brail engines.

His thoughts first dwelt a little on yesterday's battle and on the wondrous treasure now in his hands. Then they touched the approaching campaign beyond the Iron Mountains in regions never yet seen by any white man's eye, and for awhile enveloped some of the potentialities of that campaign.

But "Captain Alden" recurring to his mind, drove away such stern imaginings. The Master's lips smiled, a little; his black eyes softened, and for a moment his face assumed something that might almost have made it akin to those of men who feel the natural passions of the heart. Never before had the Master's expression been quite as now.

"Who can she be, I wonder?" he mused. "A woman like that, possessed of that extraordinary beauty; a woman with education, languages, medical skill; a woman with courage, loyalty, and devotion beyond compare, and with all the ardor for service and adventure that any man could have—who can she be? And—damn it, now! Who am I, to be thinking of such nonsense, after all?"

His eyes fell on the table. Something lay there, agleam with the sunlight flickering blood-red spots from a polished metal surface. What could this thing be? Surely, it had not been there, the night before.

The Master wrinkled heavy brows, focussing his sight on this metal object. Puzzled, not yet able to make it out clearly, he raised himself on his elbow and peered with close attention at the mysterious object.

Suddenly he leaped from the berth, strode to the table and caught up—Rrisa's dagger.

"Allah! What's this?" he exclaimed. "Rrisa—he's been here—and with a knife—"

For a second or two he stood there, staring at the *jambiyah* in his grip. His powerful frame tautened; his thick, corded neck swelled with the intensity of his

emotions as his head went forward, staring. His jaw set hard. Then with a kind of half-comprehension, he turned quickly toward the window.

Yes, there were traces on the sill, that could not be mistaken. The Master's keen eyes detected them, under the morning sun. He stepped to his desk, dropped the dagger into a drawer, and pressed the button for his orderly.

No one appeared. The Master rang again. Quite in vain. With more precipitation than was customary with him, he dressed and went to Rrisa's cabin.

Its emptiness confirmed his suspicions. Returning along the outer gallery, a little pale, he reached the railing opposite his own window. Here a scratch on the metal drew his attention. Closely he scrutinized this scratch. A hint of whitish metal told the tale—metal the Master recognized as having been abraded from a ring the Master himself had given him; a ring of aluminum alloy, fashioned from part of a Turkish grenade at Gallipoli.

The Master's face contracted painfully. In his mind he could reconstitute the scene—Rrisa's hands gripping the rail, his climb over it, his leap. For a moment the Master stood there with blank eyes, peering out over the burning, tawny desolation of the great sand-barrens that stretched away, away, to boundless immensity

"Yes, he is surely gone," he whispered. *"Shal'lah! Rasi Allahu anhu!"* (It is Allah's will; may Allah be satisfied with him!) "What would I not give to have him back!"

The trilling of his cabin phone startled him to attention. He entered, took the receiver and heard Leclair's voice from the pilot-house:

"Clouds on the horizon, my captain. And I think there is a mountain range coming in sight. Would you care to look?"

The Master, very grim and silent, went into the pilot-house. He had decided to make no mention of what had happened. The suicide must pass as an accident. He himself must seem to have no knowledge of it. Morale forbade the admisssion either of treachery or self-destruction, for any member of the Legion.

Over the Iron Mountains

THE sight of vague, pearl-gray clouds on the far southeast horizon, and of a dim, violet line of peaks notched across the heat-quivering sky in remotest distances, struck him like a blow in the face. Clouds must mean moisture; some inner, watered plain wholly foreign to the general character of the Arabian Peninsula. And the peaks must be the Iron Mountains that Rrisa had told him about. They seemed to rebuff him, to be pointing fingers of culpability at him. Had it not been for his insistence—

"But that is all nonsense!" he tried to assure himself, as he took his binoculars from the rack and sighted at the forbidding, mysterious range. "Am I responsible for a Moslem's superstitions, or his fanatic irrationality?"

The Master's own narrow escape from death disturbed him not at all. He hardly even thought of it. All he strove for, now, was to exculpate himself for Rrisa's death. But this he could not do.

A sense of blood-guiltiness clung about him like a garment—the first that he had felt on this expedition. His soul, unemotional, practical, hard, was at last touched and wounded by the realization that Rrisa, pushed beyond all limits of endurance, had chosen death rather than inflict it on his sheik. And the thought that the faithful orderly's body was now lying on the flaming sands, hundreds of miles away—that it was already a prey to the jackals, kites, and buzzards—sickened his shuddering heart and filled him with remorse.

"Allah send a storm of sand-jinn to bury the poor chap, that's all I can wish now!" he pondered as he studied the strange yellowish and orange tints in utmost horizon distances. The air, over the shimmering peaks, seemed of a different quality from that elsewhere. To north, to west, the desert rim of the world veiled itself in magic blue, mysteriously dim. But there, it glowed in golden hues. What, thought the Master, might be the meaning of all this?

The Master had no more time for speculation. The urgent problem of locating the Bara Jannati Shahr, beyond that inhospitable sierra, banished thoughts of all else. He inspected his charts, together with the air-liner's record of course and position. He slightly corrected the direction of flight. "Captain Alden" was already in the pilot-house, with Leclair. The Master summoned Bohannan tersely, and briefly instructed him:

"You understand, of course, that we may now be facing perils beyond any yet encountered. We have already upset all Islam, and changed the *kiblah*—the direction of prayer—for more than two hundred million human beings. The 'fronting-place' is now aboard Nissr.*

"The most intense animosity of religious fanaticism will pursue us. If the news of our exploit has, in any unaccountable way such as the Arabs know how to employ, reached Jannati Shahr, we are in for a battle royal. If not, we still have a chance to use diplomacy. A few hours now will determine the issue.

"We are approaching what will probably be the final goal of this expedition; a city beyond unknown mountains; a city that no white man has ever seen and that few have even heard of. What the conditions will be there no one can tell; but—"

"Not even Rrisa?" put in the major. "Faith, now's the time, if ever, to consult that lad!"

"Correct, for once," assented the Master. With purpose to deceive, he phoned for Rrisa. No answer coming, he got Simonds on the wire and ordered him to find the orderly. The investigation thus started would, he knew, soon bring out the fact of the orderly's disappearance. This line of action fairly started, he went on formulating his plans:

"Major, look well to your guns. For once you may have a chance to use them. I have put my various pieces of apparatus in good condition, and have improvised some new features. In addition, we have the second kappa-bomb.

"But I trust we shall not be driven to a fight. If diplomacy can win, there will be no bloodshed. Otherwise, our only limit will be the total destruction of these unknown people, or our own annihilation. It's a case, now, of win what we are after, or end everything right there, beyond those mountains!"

He ascended to the upper port gallery, and concentrated himself on observation. A certain change in the desert was becoming noticeable, as the air-liner flung herself at high speed into the southeast. At times there must be a little rainfall here, or else some hidden source,

* So long as the Black Stone was at the Ka'aba, this building was the only spot in the world where the *kiblah* was circular, that is, where Moslems could pray all round it. The Legion's robbery of the Stone completely dislocated all the most important beliefs and customs of Islam.

of water, for a scrub of dwarf acacia, of camel-grass and tamarisk had begun to show.

But as the black, naked mountains drew near, this gave place to flats white with salt, to jagged upcroppings of dull, yellowish rock—how little they then suspected its true nature!—and to detached cliffs sharp as a wolf's teeth, with greenstone schist outcroppings.

It was at 9.30 a.m., of May 28, that Nissr tilted her planes and soared abruptly over the first crags of the Iron Mountains. At a height of four thousand five hundred feet she soared above them, the heat of their sun-baked blackness radiating up against her wings and body. No more terrible desolation could be imagined than this rock fortress, split with chasms and unsounded gorges, where here and there more of the yellow outcrops showed. No life appeared, not even vultures. For more than an hour, Nissr's shadow leaped across this utter solitude of death.

The Master summoned Leclair, Bohannan, and "Captain Alden," and for some time gave them careful instructions which none but they were allowed to hear.

CHAPTER XXXVI
Journey's End

ALL this time, the strange, yellowish sheen against the heavens was increasing. What would lie beyond the mountains—who could tell? But that its nature was wholly different from anything any white man had ever yet beheld, seemed obvious.

Quite suddenly, at 10:05, the Master's binoculars detected a break far to southward, in the craggy wall of rock. He ordered Nissr's beak turned directly thither. Swiftly the eagle of the air held her course, speeding like an arrow. And now a vast, open plain was seen to be spreading away, away to indeterminable distances; a plain the further limits of which veiled themselves in bister and dull ocher vapors.

The aureate shimmer on the sky kept steadily increasing, from a point somewhat to the left of Nissr's line of flight. What this might be, none could guess. None save the Master. More agitated than any had ever seen him, he stood there at the rail, lips tight, hands tightly clutching the binoculars at his eyes.

"By Allah!" the major heard him mutter. "It can't be true—the thing I've heard. Only a fable, surely! And yet—"

Now the vast plain was coming clearly to view. It appeared fully under cultivation, with patches of greenery that denoted gardens, palm-groves, fruit-orchards; all signs of a well-watered region here at the center of the world's most appalling desert.

This in itself was a thing of astonishment. But it faded to insignificance as all at once a far, dazzling sheen burst on the watchers. Up against the sky a wondrous, yellow blaze seemed to be burning. Enormously far away as it still was, it filled the heart of every observer with a strange, quick thrill of wonder, of hope. Something of wild exultation seemed to leap through the legionaries' veins, at sight of that strange fire.

Leclair glanced at the Master. The dark, taciturn man, for all his self-control, had set teeth into his lip till the blood was all but starting.

On, on swooped Nissr. Now the plain was widening. Now, off at the left, behind the shimmer of the wondrous sight that seemed a fantastic city of dreams, long black cliffs had become visible—surely some spur of the Iron Mountains, making to southward at the eastern edge of the plain. This line of crags faded, in remote distance, into the brown vapors that ringed the mystic horizon.

"The city?" asked Bohannan. "That—can't be the city, can it, now? Faith, if it *is*, we're too late. Damn me, sir, but the whole infernal place is on fire! Just our rotten luck, eh?"

The Master made no reply. As if he would devour the place with his eyes, he was leaning over the rail, boring through those powerful glasses at the dazzle and bright sheen of the wonder-city now every moment becoming more clearly visible.

That it was in truth a city could no longer be doubted. Long walls appeared, pierced by gates with fantastic arches. Domes rose to heaven. Delicate minarets, carved into a fretwork of amazing fineness, pointed their fingers at the yellow shimmering sky. The contrast of that brilliance, with the soft green gardens and feathery palm-groves before, the grim black cliffs behind, filled the legionaries with a kind of silent awe.

But most wonderful of all was the metallic shimmer of those walls, domes, minarets, under the high sun of this lost Arabian paradise. So amazing was the prospect that, as Nissr hurled herself in over the last ranges of the mountains and shot out across the open plain itself, only one man found words.

This man was Leclair. Close beside the Master, he said in Arabic:

"I too have heard, my captain. I too know the story of the Bara Jannati Shahr—but I have always thought it fable. Now, now—"

"Faith!" interrupted the major, with sudden excitement. He smote the rail a blow with an agitated fist. "If that doesn't look like gold, I'm a—"

"Gold?" burst out the Master, unable longer to control himself. "Of course it's gold! And we—are the first white men in all the world to look on it—the Golden City of Jannati Shahr!"

Stupefaction overcame the Flying Legion. The sight of this perfectly incredible city, which even yet—despite its obvious character—they could not believe as a reality, for a little while deprived all the observers of coherent thought.

Like men in a daze, they stood watching the far-distant mass of walls, buildings, towers, battlements all agleam with the unmistakable sheen of pure metal. The human mind, confronted by such a phenomenon, fails to react, and for a while lies inert, stunned, prostrate.

"Gold?" stammered the major, and fell to gnawing his mustache, as he stared at the incredible sight. "By God—gold? Sure, it can't be *that!*"

"It not only can be, but is!" the Master answered. "The old legend is coming true, that's all. Have you no eyes in your head, major? If that shine isn't the shine of gold, what is it?"

"Yes, but the thing's impossible, sir!" cried Bohannan. "Why, man alive! If that's gold, the whole of Arabia would be here after it! There'd be caravans, miners, swarms of—"

"It's obvious you know nothing of Moslem severity or superstition," the Master interrupted. "There is no Mohammedan beggar, even starving, who would touch a grain of that metal. Not even if it were given him. There's not one would carry an ounce away from the Iron Mountains. This whole region is under the ban of a most terrific *tabu*, that loads unthinkable curses on any human being who removes a single atom

of any metal from it!"

"Ah, that's it, eh?"

"Yes, that's very much it! And what is more, major, no word of this ever gets out to the white races—or hardly any. Nothing more than vague rumors that hardly amount to fairy-stories. Even though I forced Rrisa to tell me the location of this city, he wouldn't mention its being gold, and I knew too much to ask him or try to make him. Why, he'd have been torn to bits before he'd have betrayed *that* Inner Secret. So now you understand!"

"I see, I see," the major answered, mechanically. It was plain, however, that his mind had received a shock from which it had not yet fully recovered. He remained staring and blinking, first chewing at his mustache and then tugging it with blunt, trembling hands. Now and then he shook his head, like a man just waking from a dream and trying to make himself realize that he is indeed awake.

The others, some to a greater degree, some to a less, shared the major's perturbation. A daze, a numb stupefaction had fallen on them. The Master, however, soon recalled them to activity. Not much time now remained before Nissr must make her landing on the plain near the Golden City. None was to be wasted.

Vigorous orders set the legionaries to work. The machine-guns were loaded and fully manned; several pieces of apparatus that the Master had been perfecting in his cabin were brought into the lower gallery; every one was commanded to smarten his personal appearance. The psychology of the Oriental was such, well the Master knew, that the impression the Legion should make upon the people of this wonder-city could not fail to be of the very highest importance.

The plain over which Nissr was now sweeping, with the black mountains left far behind, seemed a fairyland of beauty compared with the desolation of the Central Arabian desert.

"This is surely a fitting spot for the exact geometrical center of Islam," the Master said to Leclair, as they stood peering down. "My measurements show this secret valley to be that center. Mecca, of course, has only been a blind, to keep the world from knowing anything about this, the true heart of the Faith. The Meccans have been usurping the Black Stone, all these centuries, and these Jannati Shahr people have submitted because any conflict would have betrayed their existence to the world. That is my theory. Good, eh?"

"Excellent!" the lieutenant replied. "There must be millions of Mohammedans, themselves, who have hardly learned of this valley. Certainly, very few from the outside world have ever been able to cross the Empty Abodes, and reach it.

"These people here evidently represent a far higher culture than any other Moslems ever known. Who ever saw a finer city—apart from its material—or more wonderful cultivation of land?"

His eyes wandered out over the plain, which lost itself to sight in the remote south. Roads in various directions, with here and there a few white dromedaries bearing bright-colored *shugdufs* (litters), showed there was travel to some other inhabited spots inside the forbidding mountain girdle.

No Dallying

HERE, there, herds of antelope and flocks of sheep were grazing on broad meadows, through which trickled sparkling threads of water, half-glimpsed among feathery-tufted date-palms. Plantations of fig and pomegranate, lime, apricot, and orange-trees, with other fruits not recognized, slid beneath the giant liner as she slowed her pace. And broad fields of wheat, barley, tobacco, and sugar-cane showed that the people of the city had no fear of any lack.

Birds were here—pelicans, cranes, and water-fowl along the brooks and gleaming pools; swift little yellow birds with crownlike crests; doves, falcons, and hawks of unknown species. Here was life abundant, after the death of the Empty Abodes. Here was rich color; here arose a softly perfumed air, balmy, incensed as with strange aromatics. Here was peace—eternal *kayf*—blessed rest—here indeed lay a scene that gave full explanation of the ancient name: "Arabia Felix."

And at the left, dominating all this beauty, shone and glimmered in the ardent sun the wondrous, Golden City of Jannati Shahr.

Nissr had already begun to slant to lower levels. Now at no more than two thousand five hundred feet, with greatly reduced speed, she was drifting down the valley toward the city, the details of which were every moment becoming more apparent. Its size, the wondering legionaries saw, must be very considerable; it might have contained three or four hundred thousand inhabtants. Its frontage along the black mountains could not have been less than two and a half miles; and, as it seemed to lose itself up a defile in those crags, no way at present existed of judging its depth.

The general appearance was that of stern simplicity. A long wall of gleaming yellow bounded it, from north to south; this wall being pierced by seven gates, each flanked by minarets. Behind the wall, terraces arose, with *mesjid* (temple) domes, innumerable houses and some larger buildings of unknown purpose.

The powerful glasses on Nissr showed fretwork carving everywhere; but the main outlines of the city, none the less, gave an impression of almost primitive severity. No touch of modernity affected it. All looked immensely archaic.

"The Jerusalem of Solomon's day," thought the Master, "must have looked like that—barring only that this is solid gold."

Out from the city, a little less than two-thirds of the way down, issued a rather considerable stream. It seemed to come from under the wall fronting the plain. Its course, straight rather than sinuous, lay toward the southwest, and was marked by long lines of giant date-palms and pale-stemmed eucalyptus trees, till it lost itself in brown distances.

"Faith, but that looks like lotus-eating, all right," said the major, notching up his cartridge-belt another hole. "That looks like 'A book of verses underneath the bough,' with Fatima or Lalla Rookh, or the like, eh?" He drew at a cigarette, and smiled with sweet visionings of Celtic exurberance. "A golden city! Lord!"

"You'll do no dallying 'with Amaryllis in the shade,' in *this* valley!" the Master flung at him. "Nor any lotus-eating, either. To your stations, men! Wake up! Forget all about this gold, now—remember my orders! That's all you've got to do. The gold will take care of itself, later. For now, there's stern work ahead!"

The legionaries assumed their posts, ready for whatever attack might come. They still moved like men in a trance. Whether they could quite even realize the true character of Jannati Shahr seemed doubtful. The Inca's room of gold stunned Pizarro and his men. How much more, then, must a city of gold numb any concrete thought?

Down, still down dropped Nissr, now beginning to circle in broad, descending spirals, seeking where she might land. The roar of the propellers lessened; and at the same time, the increasing hum of the helicopters made itself heard, counterbalancing the loss of lifting power of the planes, yet gradually letting the air-liner sink. Came, too, a sighing hiss of the air-intakes as the vacuum-floats filled.

High noon was now at hand. The sun burned, a copper ball, in the very forehead of a turquoise sky. A light breeze, lazying over the plain, stirred the fronded tufts of the date-palms' thick plantations. Beyond a mossy grove, stretching for nearly two miles out from the northernmost gate of the city, a grassy level quite like a parade-ground invited the liner to rest.

As she sank still lower, the Master's glass again picked up the city wall and ran along it. Here, there, white dots were visible; human figures, surely—the figures of men in snowy burnooses, on the ramparts of heavy metal.

The Master smiled, and nodded.

"My men think they are surprised," thought he. "What will these Jannati Shahr men think, when I have opened my little box of tricks and shown them what's inside?"

He pressed a button on the rail. A bell trilled in the pilot-house; another in the engine-room. The Norcross-Brails died to inactivity.

With a last long swoop, an abandonment of all the furious energies that for so long had been hurling her over burning sand and black crag, Nissr slanted to the grassy sward. A sudden, furious hissing burst out beneath her, as the compressed-air valves were thrown and the air-cushions formed beneath her thousands of spiracles. Then, with hardly a shudder, easily as a tired gull slips down into the quiet of a still lagoon, the vast airliner took earth.

She slid a hundred yards on her air-cushions, over the close-cropped turf, slowed, came to rest there fronting the northern gate of Bara Jannati Shahr. And the shimmer of those golden walls, one mile to east of her, painted her all a strangely luminous yellow.

Journey's end, at last!

CHAPTER XXXVII
The Greeting of Warriors

WITHOUT delay, everything was put in complete readiness for whatever eventualities might develop. If these strange people meant peace and wanted it, the Legion would give them peace. If war, then by no means was the Legion to be unprepared.

The gang-plank was put down from the starboard port in the lower gallery. The helicopters were cut off. Nothing was left running but one engine, at half-speed, to furnish current for the apparatus the Master had decided to use in dealing with the Jannati Shahr folk in case of need—some of this apparatus being of design evolved on the run from Mecca.

Four hampers were carried down the gang-plank and set on the grass, about fifty feet ahead of Nissr's huge beak, that towered in air over the men like an eagle over sparrows. These hampers contained the chosen apparatus. Wires were attached, and run back to the ship, and proper connections made at once by Leclair and Menendez, under the Master's instructions.

The machine-guns were dismounted and taken "ashore," to borrow a nautical phrase. These were set up in stategic positions before the liner, and full supplies of ammunition both blank and ball were served to them.

About a quarter of a mile to north of Nissr's position, one of the small water-courses or irrigating ditches that cut the plain glimmered through a grove of Sayhani dates.* To this ditch the Master sent two men in seach of the largest stone they could find there. When they returned with a rock some foot in diameter, he ordered it placed half-way between Nissr and the palm-grove.

These preparations made, the Master lined up his legionaries for inspection and final instructions. Standing there in military array, fully armed, they made rather a formidable body of fighters despite their paucity of numbers. Courage, eagerness, and joy—still unalloyed by all the fatigues and perils of the long trek after adventure—showed on every face. Even through the eyeholes of "Captain Alden's" mask, daring exultation glimmered.

The dead, left behind, could not now depress the legionaries' spirits. To be on solid earth again, in this wonderland with the Golden City fronting them, quickened every man's pulse.

What though they were but a handful, ringed round by grim, jagged mountains, beyond which lay hundreds of leagues of burning sand? What though an unknown people of great numbers already had begun to stir in that vast hive of gold? What though all of Islam which had already learned of the sacrilege the accursed Feringhi had wrought was lusting for their blood? Nothing of this mattered. It was enough for the legionaries that adventure still beckoned onward, ever on!

The Master, standing there before them, called the roll. We should listen, by way of knowing just how the Legion was now composed. It consisted of the following: Adams, "Captain Alden," Bohannan, Bristol, Brodeur, Cracowicz, Emilio, Enemark, Frazier, Grison, Janina, Lebon, Leclair, L'Heureux, Masterson, Menendez, Prisrend, Rennes, Seres, Simonds, Wallace. All the wounded had recovered sufficiently to be of some service. The dead were: Travers, who had died on the passage of the Atlantic; Auchincloss and Glorlitz, burned to death; Kloof, Daimamoto, Beziers and Sheffield, killed by the Beni Harb; Lombardo, killed by the Meccans; Rrisa, suicide.

In addition to these, we must not forget the Sheik Abd el Rahman, still locked a prisoner in the cabin that for some days had been his swift-flying prison-cell of torment.

The Master had just finished checking his roster, when quite without any preliminary disturbance a crackle of rifle-fire began spattering from the city. And all at once, out of the gate opposite Nissr, appeared a white-whirling swarm of figures at the same time that a green banner, bearing a star and crescent, broke out from the pinnacle of the highest minaret.

The figures issuing in a dense mass from the gate were horsemen, all; and they were riding full drive, *ventre à terre*. Out into the plain they debouched, with robes flying, a green banner snapping in the perfumed breeze, steel flashing, and over all, a great and continual volleying of rifle-fire.

This horde of rushing cavaliers must have numbered between five and six hundred; and a fine sight they made as the Master got his binoculars on them. Here, there, a bit of lively color stood out vividly against the prevailing snowy white of the mass; but for the most part, horses and men alike came rushing down like a

* *Sayhani*, "the Crier," so called because one of these palms is fabled to have cried aloud in salutation to Mohammed, when the Prophet happened to walk beneath it.

drive of furious snow across that wondrous green slope between the palm-groves and the city wall.

As they drew near, the snapping of burnooses and cherchias in the wind, the puffs of powder-smoke, the glint of brandished arms grew clearer; and now, too, the muffled sound of kettle-drums rolled down-breeze, in booming counterpart to the sharp staccato of the rifles.

Furious as an army of jinn, with wild cries, screams, howls as they stood in their stirrups and discharged their weapons toward the sky, the horsemen of Jannati Shahr drove down upon the little group of legionaries.

The major loosened his revolver in its holster. Others did the same. At the machine-guns, the gunners settled themselves, waiting the Master's word of command to mow into the white foam of that insurging wave—a wave of frantic riders and of lathering Nedj horses, the thunder of whose hoofs moment by moment welled up into a heart-breaking chorus of power.

"Damn it all, sir!" the major exclaimed. "When are you going to rip into them? They'll be on us, in three minutes—in two! Give 'em hell, before it's too late. Stop 'em!"

Leclair smiled dryly behind his lean hand, as the Master emphatically shook his head in negation.

"No, major," he said. "No machine-guns yet. You and your eternal machine-guns are sometimes a weariness to the flesh." He raised his voice, above the tumult of the approaching storm of men and horses. "I suppose you've never even heard of the *La'ab el Barut*, the powder-play of the Arabs? They are greeting us with their greatest display of ceremony—and you talk about machine-guns!"

He turned, raised his hand and called to the gunners:

"No mistakes now, men! No accidents! The first man that pulls a trigger at these people, I'll shoot down with my own hand!"

The lieutenant touched the Master's arm.

"We must give them a return salute, my captain," he said in Arabic. "To omit that would be a grave breach of the laws of host and guest—almost as bad as violating the salt!"

Fire!"

THE master nodded.

"That is quite true lieutenant," he answered. "Thank you for reminding me!"

Once more he turned to the gunners.

"Load with blanks," he commanded, "and aim at an elevation of forty-five degrees. Hold your fire till I give the word!"

"It is well, *Effendi!*" approved the lieutenant, his eyes gleaming with Gallic enthusiasm. "These are no People of the Black Tents, no Beni Harb, nor thieving Meccans. These are men of the very ancient, true Arabic blood—and we must honor them!"

Already the rushing powder-play was within a few hundred yards. The roar of hoofs, the smashing volleys of fire, the raging of the kettle-drums, the wild-echoing yells of the white company deafened the legionaries' ears.

What a sight was that—archaic chivalry in all the loose-robed flight and flashing magnificence of rushing pride! Not one, not even the least imaginative of the Legion, but felt his skin crawl, felt his blood thrill, with stirrings of old romance at sight of this strange, exalting spectacle!

In the van, an ancient horseman with bright colors in his robe was riding hardest of all, erect in high-horned saddle, reins held loose in a master-hand, gold-mounted rifle with enormously long barrel flourished on high.

Tall old chief and slim white horse of purest barb breed seemed almost one creature. Instinctively the Master's service-cap came off, at sight of him. The lieutenant's did the same. Both men stepped forward, cap over heart. These two, if no others, understood the soul of Arabia.

Suddenly the old sheik uttered a cry. An instant change came over the rushing horde. With one final volley, silence fell. The kettle-drums ceased their booming. Every rider leaned far back in his pearl-inlaid, jewel-crusted saddle, reining in his horse.

And in a moment, as innumerable unshod hoofs dug the heavy turf, all that thundering host—which but a second before had seemed inevitably bound to trample down the Legion under a hurricane of white-lathered horses and frenzied, long-robed men—came to a dead halt of silence and immobility.

It was as if some magician's wand, touching the crest of an inbreaking storm-wave, had instantaneously frozen it, white-slavering foam and all, to motionless rigidity.

Ahead of all, standing erect and proud in his arabesque stirrups, with green banner floating overhead, the chief of this whole marvelous band was stretching out the hand of salaam.

"Fire!" cried the Master.

CHAPTER XXXVIII
Bara Miyan, High Priest

THE crash of six machine-guns clattered into a chattering tumult, muzzles pointed high over the heads of the Jannati Shahr men. Up into the still, hot air jetted vicious spurts of flame.

The Legion's answer lasted but a minute. As the trays of blanks became empty, the tumult ceased.

Silence fell, strangely heavy after all that uproar. This silence lengthened impressively, with the massed horsemen on one side, the legionaries on the other. Between them stretched a clear green space of turf. Behind loomed the vast bulk of Nissr, scarred, battle-worn, but powerful. Away in the distance, the glinting golden walls shimmered across the plain; and over all the Arabian sun glowed down as if a-wonder at this scene surpasssing strange.

Forward stepped the Master, with a word to Leclair to follow him but to stand a little in the rear. The old sheik dismounted and, followed by another graybeard, likewise advanced. When the distance was but about eight feet between them, both halted. Silence continued, broken only by the dull drone of one engine still running on board the ship, by the creaking of saddle-leather, the shrill whinny of a barb.

Lithe, powerful, alert, with his cap held over his heart, the Master stood there peering from under his thick, dark brows at the aged sheik. A lean-faced old man the sheik was, heavily bearded with white, his brows snowy, his eyes a hawk's, and the fine aquilinity of his nose the hall-mark of pure Arab blood.

Hard as iron he looked, gravely observant, unabashed in face of these white strangers and of this mysterious flying house. The very spirit of the Arabian sun seemed to have been caught in his gleaming eyes, to glitter there, to reflect its pride, its ardor. He minded one of a falcon, untamed, untamable. And his dress, its colors distinguishing him from the mass of his followers, still further proclaimed the rank he occupied.

His cherchia of jade-green silk was bound with an

ukal or fillet of camel's-hair; his burnouse, also silk, showed tenderest shades of lavender and rose. Under its open folds could be seen a violet jacket with buttons of filigree ivory. He had handed his gun to the man behind him, and now was unarmed save for a *gadaymi*, or semi-circular knife, thrust into his silk sash of crimson, with frayed edges.

A leather bandolier, wonderfully tooled and filled with cartridges passed over his right shoulder to his left hip. His feet, high-arched and fine of line, were naked save for silk-embroidered *babooshes*.

The Master realized, as he gazed on this extraordinary man, whose dignity was such that even the bizarred mélange of colors could not detract from it, that he was beholding a very different type of Arab from any he had yet come in contact with.

The aged sheik salaamed. The Master returned the salutation, then covered himself and saluted smartly. In a deep, grave voice the old man said:

"A'hla wasá'halan!" (Be ye welcome).

"Bikum!" (I give thee thanks), replied the Master. "In Allah's name, who are ye?"

"Franks," the Master said, vastly relieved at this unexpected amity. Strange contrast with the violent hostility heretofore experienced! What might it mean? What might be hidden beneath this quiet surface?

Relief and anxiety mingled in the Master's mind. If treachery were intended, in just this manner would it speak.

"Men of Feringhistan?" asked the aged sheik. "And what do ye here?"

"We be fighting-men, all," replied the Master. He had already noted, with a thrill of admiration, the wondrous purity of the old man's Arabic. His use of final vowels after the noun, and his rejection of the pronoun, which apocope in the Arabic verb renders necessary in the everyday speech of the people, told the Master he was listening to some archaic, uncorrupted form of the language. Here indeed was nobility of blood, breed, speech, if anywhere!

"Fighting men, all," the Master repeated, while Leclair listened with keen enjoyment and the Legion stood attentive, with the white-burnoused horsemen giving ear to every word—astonished, no doubt, to hear Arabic speech from the lips of an unbeliever. "We have traveled far, from the Lands of the Books. Is it not meritorious, oh Sheik? Doth not thy Prophet himself say: 'Voyaging is victory, and he who journeyeth not is both ignorant and blind?' "

The old man pondered a moment, then fell to stroking his beard. The act was friendly, and of good portent. He murmured:

"I see, oh Frank, that thou hast read The Strong Book. Thou dost know our law, even though thou be from Feringhistan. What is thy name?"

"Men know me only as the Master. And thine?"

"Bara Miyan, (The Great Sir) nothing more."

"Dost thou wish us well?" the Master put a leading question.

"Kull'am antum bil khair!" (May ye be well, every year), said the old sheik. The Master sensed a huge relief. Undoubtedly—hard as this was to understand, and much as it contradicted Rrisa's prediction—the attitude of these Jannati Shahr folk was friendly. Unless indeed, all this meant ambush. But to look into those grave, deep eyes, to see that furrowed countenance of noble, straightforward uprightness, seemed to negative any such suspicion.

"We come to bring ye wondrous gifts," the Master volunteered, wanting to strike while the iron was hot.

"That is well," assented Bara Miyan. "But never before have the Franks come to this center of the Empty Abodes."

"Even Allah had to say 'Be!' before anything was!" (*i.e.*, there must be a first time for everything).

This answer, pat from a favorite verse of the Koran, greatly pleased Bara Miyan. He smiled gravely, and nodded.

"Allah made all men," he affirmed. "Mayhap the Franks and we are brothers. Have ye come by way of Mecca?"

"Yea. And sorry brotherhood did the Mecca men offer us, oh, sheik! So, too, the men of Beni Harb. Together, they slew five of us. But we be fighting-men, Bara Miyan. We took a great vengeance. All that tribe of Beni Harb we brushed with the wing of Azraël, save only the Great Apostate. And from the men of 'the Navel of the World,' (Mecca) we exacted greater tribute than even death!"

The End of the Sheik

THE Master's voice held a quiet menace that by no means escaped Bara Miyan. Level-eyed, he gazed at the white man. Then he advanced two paces, and in a low voice demanded:

"Abd el Rahman still lives?"

"He lives, Bara Miyan."

"Where is the Great Apostate?"

"In our flying house, a prisoner."

"Bismillah! Deliver him to me and thy people and mine shall be as brothers!"

"First let us share the salt!"

Speaking, the Master slid his hand into the same pocket that contained the Great Pearl Star, and took out a small bag of salt. This he opened, and held out. Bara Miyan likewise felt in a recess of his many-hued burnous. For a moment he hesitated as if about to bring out something. But he only shook his head.

"The salt—not yet, oh white sheik!" said he.

"We have brought thy people precious gifts," began the Master, again . Behind him he heard an impatient whisper—the major's voice, quivering with eagerness:

"Ask him if this place is really all gold! Faith, if I could only talk their lingo! Ask him!"

"I shall place you under arrest, if you interfere again," the Master retorted, without turning round.

"What said the White Sheik?" asked Bara Miyan, hearing the strange words of a language his ears had never before listened to.

"Only prayer in my own tongue, Bara Miyan. A prayer that thine and mine may become *akhawat!*"*

"Deliver unto me Abd el Rahman, and let thine *imams* (priests) work stronger magic than mine," said the old sheik with great deliberation, "and I will accept thy gifts and we will say: *'Nahnu malihin!'* (We have eaten salt together). And I will make thee gifts greater than thy gifts to me, oh White Sheik. Then thou and thine can fly to thy own country, and bear witness that there be Arabs who do not love to slay the Feringhi, but count all men as brethren.

"But if thou wilt not deliver Abd el Rahman to me, or test thy magic against my magic, then depart now, in peace, before the setting of the sun. I have spoken!"

"Take him at his word, my captain!" murmured Leclair. "We can get no better terms. Even these are a miracle!"

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*Friends bound by an oath to an offensive and defensive alliance.

"My opinion, exactly," replied the Master, still facing Bara Miyan, who had now stepped back a few paces and was flanked by two huge Arabs, in costume hardly less chromatic, who had silently advanced.

"I accept," decided the Master. He turned, ordered Enemark and L'Heureux to fetch out the Apostate, and then remained quietly waiting. Silence fell on both sides, for a few minutes. The Arabs, for the most part, remained staring at Nissr, to them no doubt the greatest miracle imaginable. Still, minds trained to believe in the magic carpet of Sulayman and quite virgin of any knowledge of machinery, could easily account for the airship's flying by means of jinn concealed within its entrails.

As for the legionaries, their attention was divided between the strange white host, still sitting astride those high-necked, slim-barreled Nedj horses, and the luring glimmer of the golden walls. In a few minutes, however, all attention on both sides was sharply drawn by the return of the two legionaries with the Apostate.

Without ado, the lean, wild man of the Sahara was led, in wrinkled burnouse, with disheveled hair, wild eyes and an expression of helpless despair, to where the Master stood. At sight of the massed horsemen, the grassy plain—a sight never yet beheld by him—and the golden, glimmering walls, a look of desperation flashed into his triple-scarred face.

The whole experience of the past days had been a Jehannum of incomprehensible terrors. Now that the climax was at hand, strength nearly deserted him even to stand. But the proud Arab blood in him flared up again as he was thrust forward, confronting Bara Miyan. His head snapped up, his eyes glittered like a caged eagle's, the fine, high nostrils dilated; and there he stood, captive but unbeaten, proud even in this hour of death.

Bara Miyan made no great speaking. All he asked was:

"Art thou, indeed, that Shayton (devil) called Abd el Rahman the Reviler?"

The desert shiek nodded with arrogant admission.

Bara Miyan turned and clapped his hands. Out from among the horsemen two gigantic black fellows advanced. Neither one was Arab, though no doubt they spoke the tongue. Their features were negroid, of an East African type.

The dress they wore distinguished them from all the others. They had neither tarboosh nor burnous, but simply red fezes; tight sleeveless shirts of striped stuff, and trousers of Turkish cut. Their feet and legs were bare.

Strange enough figures they made, black as coal, muscled like Hercules, and towering well toward seven feet, with arms and hands in which the sinews stood out like living welts. Their faces expressed neither intelligence nor much ferocity. Submission to Bara Miyan's will marked their whole attitude.

"Sa'ad," commanded Bara Miyan, "seest thou this dog?"

"Master, I see," answered one of the gigantic blacks, speaking with a strange, thick accent.

"Lead him away, thou and Musa. He was brought us by these *zawwar* (visitors). Thy hands and Musa's are strong. Remember, no drop of blood must be shed in El Barr.* But let not the dog see another sun. I have spoken."

The gigantic executioner—the strangler—named Sa'ad, seized Abd el Rahman by the right arm. Daud, his tar-hued companion, gripped him by the left. Never a word uttered the Apostate as he was led away through the horsemen. But he gave one backward look, piercing and strange, at the Master who had thus delivered him to death—a look that, for all the White Sheik's aplomb, strangely oppressed him.

Then the horsemen closed about the two Maghrabi, or East Africans, and about their victim. Abd el Rahman, as a living man, had forever passed from the sight of the Flying Legion.

His departure, in so abrupt and deadly simple a manner, gave the Master some highly conflicting thoughts. The fact that no blood was ever to be shed in this city had reassuring aspects. On the other hand, how many of these Maghrabi stranglers did Bara Miyan keep as a standing army? A Praetorian guard of men with gorilla-hands like the two already seen might, in a close-corner, prove more formidable than men armed with the archaic firearms of the place or with cold steel.

A sensation of considerable malaise crept over the Master as he pondered the huge strength and docility of these two executioners. It was only by reflecting that the renegade sheik would gladly have murdered the whole Legion, and that now (by a kind of poetic justice) he had been delivered back into the hands of the Sunnites he had so long defied and outraged, that the Master could smooth his conscience for having done this thing.

The direct, efficient way, however, in which Bara Miyan dealt with one held as an enemy, urged the Master to expedite the ceremony of giving and taking salt.

At all hazards, safeguards against attack must be taken. Once more the Master addressed Bara Miyan:

"Effendi! Our gifts are great to thee and thine. Great, also, is our magic. Let thy *imams* do their magic, and we ours. If the magic of El Barr exceeds ours, we will depart without exchange of gifts. If ours exceeds thine, then let the salt be in our stomachs, all for all, and let the gifts be exchanged!

"Thy magic against our magic! Say, oh sheik, dos thou dare accept that challenge?"

The old man's head came up sharply. His eyes gleamed with intense pride and confidence.

"The magic of the Unbelievers against that of the People of the Garment!" (Moslems), cried he. *"Bismillah!* To the testing of the magic.

CHAPTER XXXIX
On, to the Golden City!

THE Spartan simplicity of the proceedings impressed the Master far more than any Oriental ceremony could have done. Here was the Olema, or high priest and chief, of a huge city carved of virgin gold, coming to meet him on horseback and speaking to him face to face, like a man.

It was all archaic, patriarchal, dramatic, in the extreme. No incensed courts, massed audiences, tapestried walls, trumpeting heralds, genuflexions, could have conveyed half the sense of free, virile power that this old Bara Miyan gave as he stood there on the close turf, under the ardent sun, and with a wave of his slim hand gave the order:

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*Literally "The Plain." This name, no doubt, originally applied only to the vast inner space surrounded by the Iron Mountains, seems to have come to be that of Jannati Shahr itself, when spoken of by its inhabitants. El Barr is probably the secret name that Rrisa would not divulge.

"The magic! To the testing of the magic!"

Thoroughly well pleased with progress thus far, the Master turned back to give final instructions to his men and to examine the apparatus. This was in perfect condition, all grouped with controls centered in one switchboard and focussing-apparatus so that Brodeur, in charge, could instantly execute any command.

Bara Miyan, clapping his hands again, summoned three horsemen who dismounted and came to him. By the emerald color of their head-fillets and jackets, as well as by their tonsure, the Master recognized them as mystics of the class known as *sufis*.

That he was about to face a redoubtable test could not be doubted. Long experience with Orientals had taught him the profundity of their legerdemain, practically none of which has ever been fathomed by white men. The Master realized that all his powers might be tried to the utmost to match and overcome the demonstration of the Jannati Shahr folk.

While Bara Miyan stood talking to the three *sufis*, the Master was in a low voice instructing his own men.

"Everything now depends on the outcome of the approaching contest," said he. "These people irrespective of what we show them, will probably evince no surprise. If we allow any sign or word of astonishment to escape us, no matter what they do, they will consider us beaten and we shall lose all. There must be no indication of surprise, among you. Remain impassive, at all costs!" He turned to Brodeur, and in French warned him:

"Remember the signals, now. One mistake on your part may cost my life—more than that, the lives of all the Legion. Remember!"

"Count on me, *mon capitaine!*" affirmed Brodeur. The masked woman, coming to the Master's side, said also in French:

"I have one favor to ask of you!"

"Well, what?"

"Your life is worth everything, now. Mine nothing. Let *me* subject myself—"

He waved her away, and making no answer, turned to the Olema.

"Hast thou, oh Bara Miyan," he asked in a steady voice, "a swordsman who with a single blow can split a man from crown to jaw?"

"Thou speakest to such a one, White Sheik!"

"Take, then, a scimitar of the keenest, and cut me down!"

The old man turned, took from the hand of a horseman a long, curved blade of razor-keenness and with a heavy back. The Master glanced significantly at Brodeur, who knelt by the switchboard with one steady hand on a brass lever, the other on the control of a complex ray-focussing device.

Toward Bara Miyan the Master advanced across the turf. He came close. For a moment the two men eyed each other silently.

"Strike, son of the Prophet!" cried the Master.

(To be concluded)

One Hundred Dollars in GOLD

for a SLOGAN for

AIR WONDER • STORIES

A few moments of your spare time NOW may bring you $100.00 in GOLD!

WE want a catchy slogan for this magazine. Slogans are used universally in many different lines of business, and we believe that this magazine should be known by its own slogan.

Such slogans as "NOT A COUGH IN A CARLOAD"; "GOOD TO THE LAST DROP"; "SAY IT WITH FLOWERS," etc., are well known. A number of magazines have already adopted slogans; such, for instance, as "Popular Mechanics," with "WRITTEN SO YOU CAN UNDERSTAND IT."

We are offering $100.00 for a novel, as well as descriptive, catchy phrase, which we shall use after the end of the contest as a permanent slogan of this magazine.

REMEMBER, THERE IS NOTHING TO BUY OR TO SELL!

You have an equal chance to win this prize, regardless of whether or not you are a subscriber. The contest is open to all. Get your friends in on this and, if they give you suggestions, you may split the prize with them, if you so desire.

To win the $100.00 prize, you must submit only a single slogan, ONE ONLY. It must be an original idea. It makes no difference who you are or where you live, whether in this country or not, anyone may compete in this contest and you may be the winner.

Look this magazine over carefully and try to find out what it stands for, what its ideals are, and what it tries to accomplish. Then try to put all of your findings into a slogan which must not, under any circumstances, have more than seven words.

After you have the idea, try to improve upon it by shortening the slogan and making it sound more euphonious; but always remember that it is the idea which counts. The cleverer the slogan, and the better it expresses the ideas for which this magazine stands, the more likely are you to win the prize.

No great amount of time need be spent in the preparation of slogans. Start thinking right now and jot down your thoughts. Also, tell your friends about it, and get them to submit slogans of their own, or compose one in partnership with them.

Here are a couple of sample slogans; which are given as mere suggestions, AND NOT TO BE USED AS ENTRIES.

"THE MAGAZINE FOR AIR-SCIENCE FANS"
"SCIENCE AVIATION OF THE FUTURE"

RULES FOR THE CONTEST

(1) The slogan contest is open to everyone except members of the organization of AIR WONDER STORIES and their families.

(2) Each contestant may send in only one slogan; no more.

(3) Slogans must be written legibly or typed on the special coupon published on page 849 of this magazine. (If you do not wish to cut the magazine, copy the coupon on a sheet of paper exactly the same size as the coupon.) Use only ink or typewriter; pencilled matter will not be considered.

(4) Each slogan must be accompanied by a letter stating in 200 words, or less, your reasons for selecting this slogan.

(5) In case of duplication of a slogan, the judges will award the prize to the writer of the best letter; the one which, in their opinion, gives the most logical reasons for the slogan.

This contest closes on May 1, 1930, at which time all entries must be in this office; and the name of the winner will be announced in the July, 1930, issue of AIR WONDER STORIES, on publication of which the prize will be paid.

Because of the large number of entries which may be expected, the publishers cannot enter into correspondence regarding this contest.

Address all communications to:

Editor, Slogan Contest
Care of AIR WONDER STORIES
96-98 Park Place New York, N. Y.

The Space Visitors

(*Continued from page* 811)

it meant struck through to my terror-numbed heart. Victory, whether partial or complete—it meant the dissolution of the spell of horror that had gripped earth, the gathering of earth's forces to carry on the struggle, if need be, against foes whom we now knew were not invincible. Victory, and in a few moments the word of it would be flashing out around the earth. . . .

Our victory proved complete after all, at least in so far as it marked the end of the terrible trawlings. Whether the two huge space-ships that had met their end over Georgia were the only ones to come to earth, or whether there were others that were forced to flee by this destruction of their fellows, we cannot say. We know only that after the fall of those two through the night, the colossal trawls did not descend again. But for days, weeks, and months, the world waited in anxious dread for their reappearance.

"We Have Come of Age"

EVEN now that dread has not disappeared, wholly. For never again will earth seem to us the isolated globe that it once was. We know now that there are ships that come and go out there in the great void, ships from some near or far planet. They came once to visit the earth, to trawl in its air-ocean with their giant scoops, and they may come again. We cannot say that they will not. We can but pray that they will not

Of their nature we know no more than before. Dr. Howard and the greatest scientists of the world have examined with the utmost minuteness the two great metal wrecks in Georgia, but have been able to learn comparatively little from them, so fused into molten metal were they by their plunge down through the atmosphere. The glittering metal of which they were constructed has proved quite strange and impossible to produce on earth. There have been found half-melted instruments or mechanisms in small number, whose purpose we cannot as yet understand.

What of the beings who manned those mighty ships? That is perhaps the greatest question of all, and the most insoluble. A thin coat of strange glistening slime was found on a few parts of the two wrecks not melted. Whether that is all that remains of the space-visitors of those ships, whether their bodies were solid or liquid or even gaseous or merely force emanations, we can offer only theories.

The world has recovered fully from those days of horror, and in recovering has given to Dr. Howard the honors due him. He is beyond all question the greatest figure in the world today and even on myself, as his companion and assistant, some of his fame has fallen. For he is the hero not of any single group or nation or race of men, but of all mankind.

He has used the tremendous influence that is his alone to urge preparation upon the world, preparation for emergencies of a similar nature that may again arise.

"Out of the unknown came these dread space visitors to earth," he warns in an article, "and who knows but that somewhere in the unknown even today other grim vessels are winging through the void toward the earth? It may even be that our present peace is only a respite and that we have repelled the first attack of these unknown beings only to have them coming again upon us in infinitely greater numbers. Sometime in the future, I think, man will have advanced in knowledge to the point where he too will venture into the void, will be able to meet his attackers face to face. But until then the air-mines are our only protection.

"I want to see vast fields of them floating on the surface of earth's atmosphere, fields through which no invading space ships from the void outside can make their way. For Providence may not again aid our efforts. Man is probably but one being among the universe's countless races of living creatures, and he can only hold his planet against others by his own wisdom and strength. Never again can he feel the false security that was ours before these space visitors came."

This warning, surely, we are heeding; yet even with the loss of that old false security, we do not face the future with fear. Whatever beings of power the universe holds, we realize now that we too are beings of power. We have fought for our planet against the space visitors and have held it. As a race we have come of age.

THE END

WHAT IS YOUR KNOWLEDGE OF AVIATION?

Test Yourself by This Questionnaire

THE questions given below are taken from the stories in this issue. They will serve, by your ability to answer them, to test yourself in your knowledge of aviation. By thus testing yourself, you will be able to fix in your mind a number of important facts of aviation that are presented by the stories.

The pages, on which the answers are given, follow each question.

1—What is an aerolite? (Page 828)

2—Of what use is a helicopter when the propellers of a plane cease to function? (Page 834)

3—On what principle does a dirigible operate? (Page 813)

4—What electrical phenomenon does a plane cause when it is struck by a bolt of lightning? (Page 818)

5—What electrical forces surround a plane flying near a charged cloud? (Page 818)

6—Where do meteors originate, and how do they arrive on the earth? (Page 806)

7—What is the depth of the atmospheric ocean that covers the earth? (Page 807)

8—How could a hollow sphere be made to rise to the surface of the earth's atmosphere? (Page 808)

THE RETURN OF THE AIR MASTER

(*Concluded from Page* 803)

later to see the now lifeless form of Jolsen crushed beneath his own deadly instrument.

As the switch-board gave way, the grip of the paralyzing ray released its hold, and Riel staggered to his feet. A moment's glance at the crushed form of the wizard told him that there was no possible chance of there being a spark of life left in him, and becoming aware of his own danger, he had to leave the lifeless body behind and fight his way to the door leading to the stairs. He realized the danger of staying there among the blazing mass of unknown electrical and chemical equipment. So, with eyes streaming and faltering breath, he stumbled down the stairs and out into the fresh air.

No one attempted to stop him as he tore across the lawn toward the spot where he had left the plane. In fact he saw no one, the personnel of the house having no doubt fled as soon as the fire broke out, fearing disastrous results from the deadly equipment that the building contained. As soon as he had travelled a safe distance from the building, the detective turned to witness the progress of the flames. The entire upper floor of the structure was now a roaring mass, and blazing timbers were dropping down into the lower part of the house. The minor explosions, the hisses and outbursts of thick smoke from the windows of the upper floor told of the inferno raging there. The many hideous electrical devices and countless chemical mixtures, as if freed from his tyrannical control over them, were giving the master a funeral befitting such a man. As he had lived in the world, so was his departure, violent, merciless and horrible.

Slowly the detective turned and resumed his walk. He was glad to see that his plane was still there and unmolested, and realized that with the destruction of the laboratory there would be no mysterious magnetic fields in the air to prevent him from using the ship.

A loud hissing noise from the burning building caused him to look around and stand entranced for a moment. For rising straight up from the blazing mass was a bright shaft of purple light piercing through the now clear air to the very clouds above. Detective Riel watched it in admiration as the beam shifted, twitched and faded away only to blaze out again in all its splendor, towering high and powerful as if in defiance of the world that had brought its master to his doom. Once more the beam vividly displayed all the colors of the rainbow and brightened to an intense brilliancy, then slowly faded away—a fitting climax to the fiendish but marvelous career of its master.

THE END

Whose Flight Was the More Hazardous—LINDBERGH'S or BYRD'S?

A Prize of $25.00 for the Best Answer

We publish below a letter received from a young reader in Pittsburgh.

Rear-Admiral Richard E. Byrd

Mr. Hugo Gernsback,
Editor AIR WONDER STORIES,
98 Park Place, New York City.
Dear Sir:

As an interested reader of your AIR WONDER STORIES, I wish you would give me your opinion as to whose flight was the more hazardous, Colonel Lindbergh's over the Atlantic Ocean, or Commander (now Rear-Admiral) Byrd's over the South Pole. It would be very valuable information for our School Science Club.

Nicholas Marcin,
33 Wilford Street,
Pittsburgh, Pa.

Col. Charles A. Lindbergh

WE AGREE with Mr. Marcin that the answer to this question would be a very valuable contribution to our estimate of these two outstanding figures in modern aviation, Colonel Charles Lindbergh, the first man to make a non-stop flight from America to the European continent, and Rear-Admiral Richard Byrd, whose explorations of the South Pole are making history.

In order to get the widest diversity of opinion on this very interesting question, we are inviting our readers to send us their opinions. And for the best letter received—that which gives the best reasons for the choice of either man—we will pay a prize of $25.00. We are sure that both Colonel Lindbergh and Rear-Admiral Byrd have millions of admirers who will want to defend their hero's right to the utmost pinnacle of fame.

All letters should be legibly written or typewritten single space on one side of the paper and be not over 500 words in length. All contributions must be received by March 15, 1930 and the winning letter will be printed in our June 1930 issue.

Anyone except employees of the Stellar Publishing Company and their families may enter this extraordinary contest. *All letters must be addressed to* Editor, Hazardous Flight Contest, AIR WONDER STORIES, 98 Park Place, New York City.

AVIATION NEWS OF THE MONTH

CONSTRUCTION

Curtiss Plane Wins Guggenheim Contest

THE first prize of $100,000 in the international safe aircraft competition sponsored by the Daniel Guggenheim Fund for the Promotion of Aeronautics has been awarded to the Curtiss Aeroplane and Motor Corporation for the performance of its entry, the Curtiss *Tanager*.

The only rival of the *Tanager* was the Handley-Page entry, which passed the majority of the qualifying tests, but failed to obtain the minimum gliding speed of 38 miles an hour called for by the rules of the competition. The best result obtained by the English plane in this respect was 39.7 miles an hour.

The Curtiss *Tanager* is a cabin biplane powered with a Curtiss *Challenger* air-cooled motor. It is of conventional design and departs from usual practise only in its use of slots and flaps and in its ailerons. The plane has extended wing slots, running the length of both wings, and these aid in maintaining stability at low speed. The wings are equipped with flaps in the position of the ordinary aileron. These are controlled by the pilot through a crank and sprocket arrangement to a shaft through the wings, and thence to horns almost buried in the connecting edge of the flap. The ailerons, of the full floating type, are placed at the tips of the lower wings. The plane has a span of forty-four feet and a constant chord of five feet. It weighs 1,900 pounds empty and carries a useful load of 1,400 pounds. The design is adaptable for ordinary commercial use.

R-101 to be Enlarged

THE great British dirigible, *R 101*, is to be [illegible] new large section will be [illegible] section 75 feet in length, will contain a gas bag of approximately 500,000 cubic feet capacity, and will give the ship a total gas capacity of 5,500,000 cubic feet. The added length will make the airship 800 feet long, the world's largest dirigible.

Considerable added lifting power will be gained by the reconstruction. The new gas bag will add six tons to the useful load, and with new lighter engines and modifications in the existing gas bags, the capacity of which will be increased, it is estimated that the ship will be able to carry fifteen tons more than formerly.

"Flying Freight Train" Has Tail Wheel

THE new Junkers *G 38*, largest land plane in the world, has several features characteristic of American planes. It has a tail wheel instead of a skid, compressed air brakes that may be applied individually with varying pressure on the four landing wheels, and a novel "[illegible]" device to warn the pilot when the descending plane is about to touch the ground.

Because of the height of the pilot's cockpit, and the pilot's position, the ground immediately in front of the operator cannot be seen when landing. An [illegible] has been attached to the nose consisting of a thin stick, two meters long, hanging down in front, and attached to a hinge. When contact with the ground is made, the stick pivots back on its hinge, and from the degree of inclination of the stick the pilot knows exactly how far above the ground he is flying. He can plan his actual landing accordingly.

The great plane, which has been dubbed by the German press a "flying freight train with passenger car attached," contains space both in the wings and in the fuselage for the payload, the wings having a depth at their beginning of roughly two meters. The four motors of the plane, with a total horsepower of 2,400, are in the interior of the wings, and their sound has been reduced to such an extent that they make less noise than is ordinarily made by a single-engined training plane.

Invents Foolproof Plane

ALEXANDRE SOUDENIKOFF of Zurich, Switzerland, claims to have invented an absolutely foolproof [illegible] that cannot turn turtle [illegible] the arrow like [illegible] Percent from all other aircraft. Instead of being at right angles to the body of the plane the wings [illegible] backward and outward, like the wings of a swallow, giving the front of the plane the appearance of an arrowhead. The tail is very small and has no part in the steering or control [illegible] but functions solely as a brake. All the rudders are on the back of the wings, the plane being so constructed that wing and controls are united. All [illegible] and steering [illegible] with flaps or vanes at the back of the wings.

The cross section of the wing of the plane is not [illegible] throughout its length. While at the body of the plane it resembles that of any ordinary airplane [illegible] end of the wing the angle changes, offering a different relationship to the windstream. At the wing tips, the angle changes again in such a manner that there is no agitation of the wind at this point during flight.

Even if one wing breaks off, it is asserted, the plane will still fly. Elaborate tests by German experts show that the plane will even fly when crippled, and that it has seven times the safety factor of any plane on the market. Exhaustive tests demonstrate that the "arrow-[illegible] will not [illegible] turtle or [illegible] at any speed [illegible] and [illegible] it on every part that if one wing were severed and dropped from a height, the wing would not turn and whirl in falling, but glide slowly and gracefully upright to the ground.

New Aero Marine Ship Developed

PAUL E. DUDLEY, 19-year-old inventor of [illegible]burg, Mass., has developed a new type of flying boat, an "aeromarine" ship, with a carrying capacity of thirty persons and a cruising speed of 95 miles an hour. Dudley will probably attempt to cross the Atlantic in his boat, which is designed to skim along the surface of the water with two wings, which are not large enough to lift it as an airplane. The craft is of very sturdy construction, to withstand heavy seas, and has three motors—a 450-H.P. Liberty motor in each wing and a 165 H.P. Rotary motor on the forward deck, for emergency use.

Opel Forecasts Rocket Plane

FRITZ VON OPEL, the first man to fly a rocket plane, has predicted that at some time in the future a rocket plane will fly around the world in six hours. Theoretically, he says in an interview with Richard Montague in the *New York Evening World*, there is nothing astonishing in a speed of 4,000 miles an hour. The type of rocket used will be propelled by liquids, not by powder; and already liquid has replaced powder in the rocket biplane in which von Opel expects to fly across the English Channel next summer.

The liquid rocket is superior to the powder variety in many ways. It can be operated continuously, for fifty or sixty hours, if necessary, and it has much more power.

In the head of the liquid rocket is a combustion chamber into which two liquids can be forced with pumps. These burn at a high temperature—5,500 degrees Fahrenheit or [illegible] are three times more powerful than nitroglycerin. A special alloy has been found to resist this terrific heat. The gas formed flows into a larger chamber and then through a much smaller opening at about 2,200 meters (7200 feet) a second, at which speed a rocket should be operated for greatest economy.

The future rocket plane may be tailless, with rudders on the wing tips. There may be one rocket in the rear of the fuselage and two others on the trailing edges of each wing.

Parachute to Lower Plane and Passengers

PARACHUTES large enough to lower a crippled plane to the ground have received successful tests and may become standard equipment. The new "chute" is the invention of J. M. Russell, of the Russell Parachute Company. Mr. Russell, working on a 'chute sixty feet in diameter, found that his greatest difficulty lay in getting the silk to open out. This problem has been overcome by a series of valves. There are three rings of valves, or vents, in the fabric; one in a circle around the top, another several feet below the first, and a third about half way between the lower edge of the silk and the center of the parachute. When the device is released, the air forces the first series of vents to open. The parachute is filled, not from underneath, but through its sides.

As soon as enough air has accumulated in the top of the parachute, it forces the valves shut from inside; then the second series opens, brings in more air which closes them, and the third series operates in a similar manner. The parachute requires about five seconds to fill with air. A 'chute fifty feet in diameter will support a plane carrying four persons. It is carried in a cylinder above the fuselage, fastened by four lines from different points, and can be released instantly by a lever.

Goddard's Rocket to Explore Outer Space

R. L. DUFFUS, writing in the *New York Times*, describes Professor Goddard's plans for exploring some of the mysteries of outer space. Goddard plans to use a rocket twelve feet long and a foot and a half in diameter, which will be shot from a sixty-foot steel tower at Camp Devens, Massachusetts.

The Goddard rocket is the first one known to make successful use of liquid fuel. The latest one is expected to go straight up for several miles and to return to the vicinity from which it was sent; the important test of the flight is the ability of the rocket to return intact. One rocket was released with a camera and a barometer, and the delicate instruments were not injured in the descent to earth. There is every reason to believe that a rocket could be sent thousands of miles [illegible] and return without injury to its [illegible] it may be possible [illegible] to the moon. [illegible] according to the [illegible] there would be [illegible] a way of stopping it [illegible] earth.

[illegible] present [illegible] the liquid rocket [illegible] a steel cylinder [illegible] and the tail [illegible] being a [illegible] [illegible] which [illegible] rapidly [illegible] When the rocket returns to earth it will be retarded by the parachute in exact proportion to the density of the atmosphere it strikes.

The speed which is expected to be attained is 8,000 feet a second, or about 5,500 miles an hour—a speed not only within the realm of possibility, but absolutely necessary for interplanetary exploration.

Airline Planes to Carry 40 Passengers

THE Pan American Airways has ordered the largest amphibian planes in the world from the Sikorsky Aviation Corporation. Two of these machines are to be built, each capable of carrying forty or more persons. The new planes represent an outlay of $250,000, and are in reality the largest machines in the world to be placed in actual service on an existing airway. They will have four *Hornet* motors and a total horsepower of 2,300. Colonel Lindbergh, who has long advocated the construction of four-engined transport machines, has hailed the new development in flying.

The new Sikorsky will be more than seventy-two feet long, will have a wing spread of more than a hundred feet, and a top speed of 129 miles per hour. The hull of the amphibian will be a development of the United States Navy's multimotored *PN* flying boat design.

OPERATION

Seek Soundproof Plane Cabin

WRITING in the *New York World*, Sherman B. Allick discusses the search for a sound proof plane cabin which will afford passengers some protection against the noise of the motors. Safety has been achieved in no small measure, and engineers have turned their attention to the comfort of passengers. Experts believe that better results will be obtained by soundproofing the cabins than by attempting to muffle the motors.

Experiments are being carried out to find a suitable material for soundproofing. Since the weight of the substance is of the utmost importance, it has been discovered that several layers of material are far more effective than one layer of the same weight. Each type of airplane presents its special problems in insulation. It is highly important to make the interior of the cabin sound *absorbing*, for without insulation on the interior the noise eventually will build up to full intensity no matter how effective the insulation may be. Soundproofing is especially important in view of the fact that the great air liners of the future may have a dozen motors—as the *D X* has—and that the elimination of noise is a factor in making America "air-minded."

New Air-mail Catapult Developed

THE Card Bushmeyer catapult, an air mail device, has successfully passed government tests. The catapult was mounted on a small automobile chassis and, when a plane swooped over it, it automatically flung the mail bags into the air at precisely the right moment. The bags swing on a cable stretched between two uprights which act as slings and triggers for the catapult. The value of the new device lies in the fact that it relieves strain on the plane itself and on its bookkeeping system.

New Diesel Air Motor Gives Greater Power

A NEW Junkers heavy oil burning motor of the Diesel type has overcome most of the difficulties in the application of the oil burning motor to aviation, and with this type of power plant it may be possible to construct larger airplanes. The motor is of unusual design, and omits many parts which are necessary in the gasoline engine—such as the magneto. There are, however, many new parts in this oil motor, but even so there is a saving in weight which is of some importance. Unlike the gasoline engine, the Diesel motor is started by compressed air.

Sun Compass Great Aid to Byrd

WHEN Commander (now Admiral) Byrd flew over the South Pole, he owed some of his success in direction finding to the Bumstead Sun Compass, according to Munson B. Adams, writing in *Air Transportation*. This instrument, which translates the solar beams into terms of direction, is the invention of A. H. Bumstead, of the National Geographic Society. Byrd has used two types of the compass—one for the North Pole flight, and one, with reversed design, for his latest achievement. To an aviator over the North Pole, the earth rotates in a counter-clockwise direction, while to one over the South Pole, it appears to rotate in a clockwise direction.

The Sun Compass, planned especially for polar exploration where magnetic compasses are unreliable, is absolutely accurate, since indications are related directly to the position of the sun. It is essentially a clock with a single hand which revolves once in 24 hours; it is equipped with a shadow pin and a translucent screen upon which the shadow of the pin can be made to fall. Since the sun, for compass purposes, apparently rotates around the earth once in every 24 hours, if the instrument is so directed that the shadow of the pin falls on the screen, the shadow will stay in the same position so long as the sun is visible and the surface upon which the compass is mounted maintains the same direction.

Byrd, who carried five of these compasses to the Antarctic, set on the Sun Compass the true solar time of his base and turned the base plate of the instrument to read due south. The latitude scale of the compass was set at 90 degrees, the location of the South Pole. All the way from Little America to the Pole, the instrument remained unchanged, except for the clock movement. The shadow of the pin remained continuously between the lines of the screen except when the plane moved from its course.

Multiple Disc Brake Developed

THE Sikorsky organization has developed a new multiple disc brake, particularly suited to the needs of amphibian planes and large airplanes, which allows the large planes to land within a space of 30 feet. It operates on the principle that two stationary plates pressing against one rotating plate will give with the same pedal pressure twice the braking action of but two plates pressed together. This rule holds as the number of plates increases, the braking action always being the number of plates, minus one, times the amount obtained from the single stationary and single rotating plane when pressed together. This affords the opportunity to obtain any desired amount of braking action. The Sikorsky brake has three stationary plates.

"Aviation News of the Month"

portrays in plain, yet concise language every important aviation advance during the month. Nowhere can the average reader get such a wealth of accurate and vital information condensed into such a small volume. Some 40 aviation magazines and newspapers are utilized by our editors in the compilation of this department. The publishers welcome short contributions to those pages from the various scientific institutions, laboratories, makers and distributors of planes, etc.

R-100 Makes First Flight

THE new British airship *R 100* has made its first flight, covering 140 miles in two hours. A remarkable feature of the flight lies in the fact that no previous tests were made of the dirigible other than those which could be conducted in the shed.

The *R 101* is slightly longer and higher than its sister ship, but the *R 100* has more engine power. Her passenger capacity is 100 and, in all probability, the newest of England's great airships is the world's fastest, with an estimated speed nearly 50% greater than that of the *R 101*. Designed specially for passenger transport, the *R 100* is 709 feet long and 131 feet in diameter, has a gross lift of 156 tons, and is driven by six engines, one at each end of the three power cars, one having a pusher and the other a tractor, or propeller. The full speed of the ship is estimated at 82 miles an hour, and the cruising speed at 75 miles an hour. The range of the dirigible is 3,600 miles at 70 miles an hour and 5,000 miles at 60 miles an hour.

U. S. Aviation on Sounder Basis Than Europe's

WILLIAM L. LAURENCE, writing in the *New York World*, points to the fact that American and European aviation have developed along absolutely independent and different lines since the war, and have only recently become aware of each other's existence. Although Americans made aviation possible, the new science was taken up by Europe when it had been abandoned here, with the result that during the war aviation became a very important part of the fighting machines on both sides. Only recently has the United States accorded aviation the hearty reception it deserves, and it took Lindbergh, Byrd and Chamberlin to make us realize its importance, according to Mr. Laurence.

Europe is still far ahead of us in military aviation, both in the number of planes and experienced pilots; but as far as the efficiency of machines is concerned, our own products are as good as those anywhere in the world, and our commercial aviation is competing strongly with that of Europe. While European air lines are government subsidized, our own organizations must depend on their own efforts. They must return dividends to investors or investment in them will cease. The paradox is curious. While the people of Europe are taxed to subsidize air lines which charge American tourists low rates, the American tourists in turn think they are being overcharged in their own country.

Detroit Airport has Automatic Lighting System

THE Grosse Ile airport at Detroit has the first automatic airport lighting system in this country, and has given Detroit its first 24-hour a day airport. The system consists of lights set flush with the surface of the field, imbedded in concrete bases 100 feet apart. The lenses are of such strength that they will withstand the impact of tail skids and bear the weight of a large plane. These light lenses are 8 inches in diameter, and colored green, so that they will not conflict with the red field boundary lights, nor the white street lamps. This green light makes the string of illumination visible at a great distance.

The automatic feature of the system is provided by a wind-operated vane. Only one runway is lighted at a time, and the T on the proper end of this runway indicates wind direction. Flashing or intermittent lights are used to signal approaching pilots. These lights are set over a parabolic reflector which throws a short beam straight up. Within each light unit a heating element is installed which keeps snow and ice off the lens throughout the winter.

Coste Sets Course Record of 5,015 Miles

CAPTAIN DIEUDONNE COSTE, with Paul Codos as a companion, has set up a new world's record for a non-stop non-refueling flight. Over a triangular course between Marseilles, Avignon, and Narbonne in France the French aviators flew 5,015 miles in fifty-two hours and thirteen minutes. The new record is nearly 200 miles better than the one held by the Italians Ferrarin and Del Prete. The plane used, a Breguet 19 plane, is that which some time ago, won the world's record for a distance flight in a straight line, when Captain Coste flew from France to the Orient.

Human Element Found Responsible for Most Accidents

THE Navy Department has made an analysis, extending over eight years, of all air crashes, and has attributed 52% of the accidents to the pilots. 18% of the crashes were caused by motor failure; 13% by structural failure; 9% by the conditions of the airport; 2% by weather, 2% by supervising personnel, and 4% through miscellaneous circumstances. This study, the most comprehensive of its kind ever undertaken, shows that in contributing to the human failure, 63% of the accidents were caused by faulty flying technique, 19% by faulty judgment, 14% by carelessness, and 4% by violation of safety regulations.

The most dangerous period for aviators is the time after they have reached 200 hours of flying. Then, feeling a confidence unwarranted by their experience, they perform involved maneuvers which result very often in fatal accidents.

Soundings of Ocean and Air to Be Made on Zeppelin Arctic Flight

SOUNDINGS of the water below, and of the air above with automatic radio-equipped balloons, will be part of the program of scientific observations to be made by the *Graf Zeppelin* when it flies over the North Polar regions next spring. The flight is to be made under the auspices of the International Society for Arctic Research by Aircraft, generally known as Aeroarctic.

The first ocean soundings from a dirigible will be made as the *Graf* sails over open lanes in the ice. This will be done with the same depth finder, which measures the time taken for a sound to reach the bottom of the ocean and be reflected back to a microphone in the apparatus. The airship will not alight, but will lower the instruments on the end of a cable to the water surface. Electrical connections between the float carrying them and the airship will reveal the water depth at any point. While the soundings are being made the Zeppelin will be navigated to follow the lane.

Aerial study will be made by sending up small balloons, equipped with instruments for measuring atmospheric pressure, temperature and humidity. These small balloons are sent up from places in populated regions, the instruments are made to record the data. Usually they are found and returned to their source. As the Eskimos cannot be depended on to return the balloons, this method cannot be used, so the balloons will be equipped with small radio transmitters. They will automatically radio their observations back to the airship.

(*Continued on page 847*)

THIS department is open to readers who wish to have answered questions on Aviation. As far as space will permit, all questions deemed of general interest to our readers will be answered here. And where possible illustrations will be used to answer the questions. Queries should be brief and not more than three should be put in any letter. Address all communications to the Editor.

The Speed of a Falling Body

Editor, Aviation Forum:

Recently I read two articles in different scientific magazines, which gave the maximum speed a falling man can attain before opening his parachute.

One article stated that a jumper quickly reached a speed of 120 miles per hour. Air resistance then prevented him from falling faster, irrespective of the length of the drop. The other article stated that the maximum speed attained is 250 miles an hour.

I would like to know what the *correct* maximum speed is.

FRANCIS WITTS,
Sullivan, Illinois.

(This question does not concern parachutes, primarily, but the laws governing the speed of falling bodies. The acceleration to the speed of a falling body in a vacuum is 32.2 feet per second each second. Naturally with air resistance this would be somewhat less. The person using the parachute is supposed to count between 5 and 10 before pulling the rip cord which opens the apparatus. The cord however is usually pulled before the count of 10 is reached. This count is made simply for the purpose of avoiding the plane if it is falling, for it would be fatal to have the parachute entangled in the falling machine.

Physically, the figures of 250 miles per hour are impossible. A man would either lose consciousness or die before that velocity was attained, and he would be unable to open the parachute. Usually, the parachute is opened after the flyer has fallen about 100 feet. In that case, he will have attained a velocity of about 80 feet per second, or 55 miles per hour, which would be attained in about 2½ seconds. He could probably count between 5 and 10 in this time.

If the man had to reach a speed of 120 miles per hour, or 176 feet per second, he would have been falling almost six seconds, and would have dropped 579.6 feet. If he attained 250 miles an hour, or 364 feet per second, it would take 12 seconds, and he would have fallen 2318.4 feet, or almost half a mile. It is almost a physical impossibility for anyone to fall that far and live, if he falls freely.

There is a maximum speed of a falling body in air, for the acceleration would be stopped by air resistance. The resistance varies as the square of the speed, so it can be easily seen that with the resistance being quadrupled by a doubled speed, and being multiplied by 9 whenever the speed is tripled, the resistance would effectually check a continual increase in speed if the fall were long enough. The actual figures, however, can be determined only by physical experiment, and this, to our knowledge, has not yet been done.—*Editor.*)

Air Speed Records

Editor, Aviation Forum.

Having had the misfortune of only recently becoming acquainted with your magazine, I missed part of "The Ark of the Covenant." The part I did read I can truthfully say was in itself the best story I have ever read. How about a sequel to it?

A little comment. In the "Aviation Forum" of the October issue of this magazine, in answer to the question "What is the greatest speed an airplane has ever traveled?" you wrote the following: "The highest recorded speed, the official record for speed in an airplane, is that held by Adjutant Bonnet of France, who made 278.5 miles per hour. A seaplane, however, piloted by Major de Bernardi of Italy, made 318.6 miles per hour." In this answer you seem to make it clear that Major de Bernardi held this speed record. (Am I right?) Yet in the editorial of your January, 1930, issue you stated that an English flyer had attained a speed of 358 miles an hour. How do you account for it?

HOWARD R. BUSCHMAN, JR.,
712 Western Avenue, Albany, N. Y.

(A speed of 358 miles an hour *was made* by Lieutenant Augustus H. Orlebar of England, but is unofficial, although it was in reality attained. It was made during the last Schneider Cup Race, which took place in September, after the October issue went to press. At the time the question referred to was answered, the new official record of 328 miles an hour had not been made. The record of 358 miles per hour is not considered because the flyer had the misfortune to leave the course for a moment or so, which disqualified him. Nevertheless, he has the distinction of having flown faster than anyone else.—*Editor.*)

The Adjustable Stabilizer

Editor, Aviation Forum:

1. Please illustrate how an adjustable stabilizer works.
2. Will the National Glider Association recognize records made by any individual, or will he have to be attached to some glider club?
3. Can a pilot obtain a license to carry freight or express if he fails to obtain a transport license?

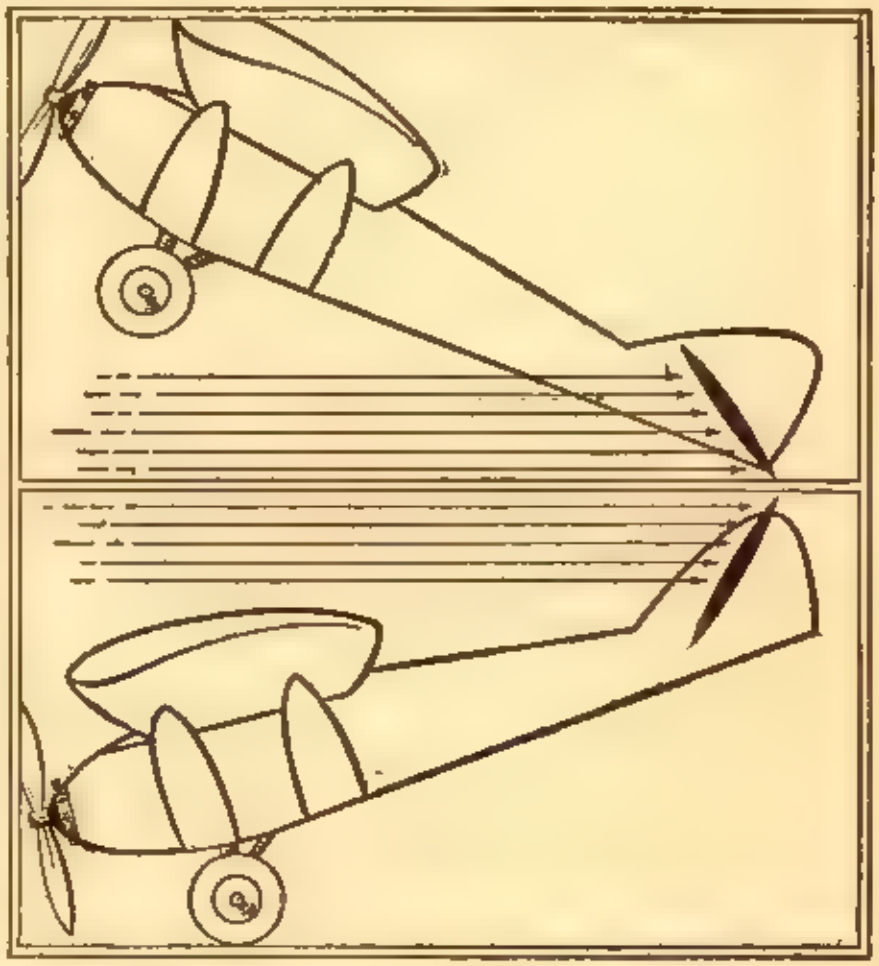
MARGARET MARTINEZ,
P. O. Box 919, Morenci, Arizona.

(1. An adjustable stabilizer is a device used to lessen the pitching motion of an airplane from nose to tail. It is usually located in the rear of the machine, and presents a flat horizontal surface. It is so arranged that its angle of incidence (that is, the angle in relation to the fuselage) can be changed during flight. The adjustable stabilizer was used extensively during the war, but at present is usually confined to the larger planes.

The principle of the stabilizer depends upon the fact that the center of pressure of the plane (the point at which the total force of the wind is considered to be centered) moves when the angle of attack is altered. The angle of attack is the angle at which the wing surface meets the air, as in climbing. As the angle of attack increases, (as the plane heads upward) the center of pressure moves forward, and vice versa. The stabilizer provides "longitudinal stability"—that is, it keeps the nose of the machine from bobbing up and down.

The stabilizer provides level flying because it is set on the tail of the plane at an angle usually less than the angle of the wing setting, and when the machine is in normal flying position, the stabilizer is parallel with the fuselage, so no undue force is exerted on it. When the angle of attack of the wings increases, or when the nose of the plane is lifted by the wind, the stabilizer increases its own angle of attack, as shown in the drawing, and raises the tail to keep the plane on an even keel. The stabilizer affects the tail only. When the machine is "tail heavy" the stabilizer is given a "positive" angle of incidence (raised) as shown in the diagram. This lifts the tail. When the plane is "nose heavy" it is given a negative angle of incidence (depressed) to depress the tail.

In operating the adjustable stabilizer, the pilot does so by turning a wheel which controls it. This wheel is rotated until the plane is balanced in level flight.



In the upper drawing, the nose of the plane has been pushed up by the wind. The stabilizer (shaded area) is elevated, with the result that the wind rushing beneath it raises the tail. In the lower drawing, the nose of the plane has been pushed down by the wind, and the stabilizer is depressed. The wind pressing against it lowers the tail.

2. The National Glider Association as a general rule recognizes records made only by individuals who belong to glider clubs affiliated with it, or by individuals who belong to the association itself without being affiliated with any club. According to the rules, "All official glider contests and individual record attempts are subject to the control of the National Contest Committee." We believe that individuals must be affiliated with the organization in order to obtain this recognition. However, we advise you to communicate directly with the National Glider Association, Union Trust Building, Detroit, Michigan.

3. As to a pilot carrying freight or express if he fails to obtain a transport license: A man may become a limited commercial pilot and be allowed to carry freight and passengers only cross country, within a limited area. Therefore a pilot can obtain a license to carry freight if he fails to receive a transport license. He will be designated either as a limited commercial pilot or as an industrial pilot. Furthermore, no pilot may operate an unlicensed aircraft containing either passengers or property.—*Editor.*)

(*Continued on page* 861)

THE READER AIRS HIS VIEWS

IN this department we shall publish every month your opinions. After all, this is your magazine and it is edited for you. If we fall down on the choice of our stories, or if the editorial board slips up occasionally, it is up to you to voice your opinion. It makes no difference whether your letter is complimentary, critical, or whether it contains a good old-fashioned brick-bat.

All of your letters, as much as space will allow, will be published here for the benefit of all. Due to the large influx of mail, no communications to this department are answered individually unless 25c in stamps to cover time and postage is remitted.

Our Authors and Their Ways

Editor, AIR WONDER STORIES

Now that you've just about settled the question of serials, whether we are to have any at all, or whether they are to be long or short, I think it's time for me to say something that should have been said a long time ago. I mean about your authors.

I notice—and I suppose others have noticed also—that some of your authors have certain characteristics which I am sure I will find even before I read their stories. For example, several people have mentioned Edmond Hamilton's habit of having his heroes save the world, or whatever it is, and either die in the attempt or escape by the skin of their teeth. And then Mr. Repp, who is pretty good in his own way, is beginning to adopt the same tactics. His hero almost dies in the attempt to perfect a new invention, to prove its worth, or to save the world. It seems that sooner or later all your stories revolve around this common center, and I would like to see some of your authors break away from this eternal narrow escape stuff, and this recurrent saving-the-world idea. Of course, all these things are exciting, in their way, but after a while we get rather fed up on them, and they don't give us the kick they used to provide.

Why can't your authors write something like "The Flying Legion." Here is a group of men seeking adventure and pleasure—understandable motives. Why make your other characters such unemotional, one-sided people that they have lost all their human feelings? Granting the fact that science is most vital in your stories, why do you have to make your characters such freaks? Has science changed the people of the twentieth century? Are we any less human now than we were in the time of King Solomon, when there wasn't any science to speak of? There's more difference between those times and the present, as far as scientific development is concerned, than there will be between the present and the future. At least, that's my idea. What I object to is this fear of some people trying to destroy the world by science, instead of using science to benefit the world. We must get away from the idea that great scientists are either madmen or unemotional machines.

I'm beginning to think that your reprints are better than your new stories. At least, they are not all alike.

Why don't you do something about it?

RAYMOND EULER.
Bronx, New York City.

(Mr. Euler's fiery attack has left us, for once, speechless. However, we are sure many of our readers will want to give their opinions of the favorite tricks of our authors. We are equally sure that many of them will want to answer this attack. To the expression of these opinions, we will open our columns. We shall be glad to hear what our many correspondents have to say on the subject.—*Editor.*)

What's the Matter with England?

Editor, AIR WONDER STORIES:

I have read the January issue of AIR WONDER STORIES, and of the three short stories, "The Storm Buster" was the best. And that serial that started in this issue . . . rotten! What kinds of drugs was England using when he wrote that story? It most certainly reads like the work of Edgar Allan Poe. To do the readers justice, the characters should arrive at Mecca in the next installment; and then they should all be killed to put them out of their misery—especially the Master. Bah! Mr. England also contradicts himself right at the start. In describing the plane he states that there are no struts or wires in the wing construction, and then he calls himself forgetful by saying that "the empty heaven whistled by from strut and wire, brace and stay." How come?

Now, while this magazine is entirely concerned with future aviation, why not leave out the articles and put another short story in their stead? Articles have no place in the middle of a magazine supposed to be all fiction.

By the way—I sure would like to know where your cover artist acquired his education in cover illustration. I also would like to see some stories in the near future by Edgar Rice Burroughs, he ought to be able to write some real science-aviation stuff. Try him anyway, and see. I'll recommend him.

R. E. McDOWELL,
Smithville, Missouri.

(Apparently Mr. McDowell must be shown, if his state is any indication of his disposition. If the worst criticism of any author is that he writes like Poe, literature should be in a much better state than it is now.

While there were no struts or wires in the wing construction of *Nuvi*, there are struts and wires in other parts of a great air liner. Mr. England is quite within his rights when he speaks of them. As a matter of fact, "The Flying Legion" is, in our opinion, one of the finest long stories we have published, and it has been hailed with enthusiasm by most of our readers. However, we are always glad to receive a dissenting opinion.

We put articles in the magazine—which is not devoted to fiction *entirely*—because we feel their timely interest will assist greatly in making clear some of the conceptions in our stories. In addition, most of our readers are intensely interested in the latest scientific developments in aviation, and an article such as Max Valier's in the February issue will certainly stimulate discussion and thought.—*Editor.*)

The Oriental Issue

Editor, AIR WONDER STORIES

Mr. Vincent states in the January issue that he did not consider the Buddhists as heroes, he merely represented them as tools of schemers. But since when has it been considered a friendly act to represent a man as a credulous, ignoble fool? Would not any self-respecting man rather go down in history as a conscious but able villain, within limits? I know of three separate effects produced by Mr. Vincent's story here in California where the Oriental issue is acute most of the time. It produced on myself and others the effect shown in my letter. It produced on the part of Buddhist readers pain, and a hopelessness of ever having their creed fairly treated by Occidental writers. It produced on certain types of mind an interest, a turn of an already existing dislike of Oriental peoples and Oriental faiths. It is no use for Mr. Vincent to lodge the undoubtedly true protest that he had no intention of producing such effects, or that it was due to the deficiencies of the types of minds affected that they were so affected.

The third type named is important enough to produce most of the wars, and cannot be left out of our calculations. Mr. Vincent not having the intention of being so taken, I think it should be a matter of interest to him to try to understand why his story produced such effects.

I think that if he will imagine an article by an Oriental wherein the Christians were lumped under some corresponding name—say "Jesusans" and cast in the same role given the "Guatamans" in his story, and try the effect on his mind, he will be able to tell whether he is prejudiced or not. If he would like such an article just as well he can't proceed. But if so, why not have struck an original note in Western fiction by writing it that way?

It is closely related to what I am afraid is a perennial problem here [illegible] years. Buddhists have lived as I lived for their profession in a way not emulated by any other faith for [illegible] centuries, as he must know. Since the days of King Asoka who united the [illegible] India was the first monarch to voluntarily, and in the height of victory, forego conquest, Buddhists have not as individuals or as bodies lent themselves to war-making ends. Now we have a story wherein they are represented as almost overnight abjuring the training and traditions which have been a part of the Buddhist character through Buddhist history!

I am not clear as to why he considers me guilty of prejudice on my part for "attacking the spirit of Christian nations." What I said was that the aims ascribed to the "Guatamans" represented very accurately the spirit of the "Christian" nations. You will note that "Christian" is in quotes, indicating the same relation between Christianity and the Occidental nations that he now says he meant to indicate between the "Guatamans" and the doctrine of Guatama Buddha. In other words my remark could not have been an attack on Christianity unless his was an attack on Buddhism. As to the actual spirit of the western nations, it is simply a historical fact that their record, both before and after Christianization, has been one of international brigandage, sometimes in most aggravated forms, while that of the Buddhist peoples has not. I do not think that it is germane to bring forth an [illegible] fact in defense of a misunderstanding [illegible] personally, I [illegible] with those who resent such facts because they are personally, religiously [illegible].

VICTOR A. [illegible]
1104 Associated Realty Building,
Los Angeles, Cal.

(While Mr. Enderstein's [illegible] quainted with the Oriental situation in California, where, as he states, it is most acute, it is also true that Mr. Vincent meant no slander on the followers of Buddha. The author, and the editors, are well aware of the peaceful triumphs of the Buddhists. In Mr. Vincent's letter is the following passage:

"I wish to point out that in 'The Yellow Air Peril' there was no reference to the doctrines of the Buddhists, nor was there a single expression of disbelief in the faith or of criticism of Buddhism as a religion. Furthermore, it was made clear . . . that the war was a result of commercializing of the devoutness and enthusiasm of true believers by a group of non-religious and power-seeking agitators and money-eyed interests.

The point is, that any religious creed can be exploited and Mr. Vincent has shown us some of the pitfalls of this possible exploitation; he has done a service to every creed and every race. It is no insult to the Buddhists to say that they were victimized; hundreds of thousands of people of all creeds and races are being exploited daily in every country. Not one class of people exists which has not, at some time or other, served the ends of economic powers.—*Editor.*)

Keeping Up with Old Sol

Editor, AIR WONDER STORIES:

I have just finished reading the December issues of your two magazines and wish to congratulate you on them. To my mind they are the best of any of the infants so far. Being a chemist with what I consider a good imagination, I've followed for a long time the trail of science fiction you blazed.

I notice that you are beginning to feature Ed Earl Repp in practically every issue. Keep it up. Mr. Repp is one of the best authors you have. His "Flight of the Eastern Star" is a masterpiece.

Another innovation of which I heartily approve is the introduction of humorous stories, such as Gleason's "Radiation of the Chinese Vegetable," and McKay's "Flannelcake." In next [illegible] I nearly [illegible] reading the latter.

"Cities of the Air" was a dandy. By the way I am sure the author made one slight mistake in that story. In the second instalment he says they were travelling at a speed of about two hundred miles an hour and keeping up with the sun. They'd have to go a good deal faster than that to keep up with [illegible]. And before I forget it, how about that Science Club?

WM. CUNNINGHAM
[illegible]
Cleveland, Ohio.

(Mr. Cunningham has followed the example of a host of other readers, who have been following us through the years. His approval of Ed Earl Repp and of our humorous authors is another voice in a chorus of approval.

Now that we consider it, perhaps a speed of 200 miles an hour is not great enough to allow one to keep up with the sun, which "moves" (let's put it that way) at about 1,000 miles an hour. Nevertheless, if Mr. [illegible] will consult the story again, he will find that Hamilton says nothing about keeping up with the sun at 200 miles an hour. He says that the maximum speed of the air liner in which the two heroes were escaping, was quite capable of keeping up with the sun.—*Editor.*)

(*Continued on page 854*)

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By RAOUL WHITFIELD

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4—WHEN THE SUN WENT OUT
By Leslie Stone

5—THE BRAIN OF THE PLANET
By Lilith Lorraine

6—WHEN THE MOON FELL
By Charles R. Calladay

7—THE MECHANICAL MAN
By Amelia Reynolds Long

The age of the robot is fast dawning and some of its intriguing possibilities, Miss Long dips into in this thrilling story.

THE THOUGHT STEALER (Book 7)
By Frank Bourne

That it may be possible sometime in the future for a brilliant scientist to penetrate the minds of others and examine their thoughts, is the theme of this engrossing story.

8—THE TORCH OF RA
By Jack Bradley

All about us lies a tremendous amount of untouched power in the sun, in the cosmic rays etc. This power if obtained and concentrated, might be put to great use.

9—THE VALLEY OF THE GREAT RAY
By Pansey E. Black

We know very little about the real potentialities of matter. There may be great civilizations that have found and utilized these potentialities far beyond our own conception.

10—THE ELIXIR
By H. W. Hodgdon

Brain power is often dependent on the influences of our glands. By proper stimulation of some kind, it may be possible in the future to produce great geniuses.

11—THE THOUGHT TRANSLATOR
By Merab Eberle

Mental telepathy is becoming generally accepted as an accomplished fact. Some of its uses especially by mechanical means, may be very unique or very amusing.

THE CREATION (Book 11)
By M. McIlon Mitchell

It should be possible in the future to create living beings scientifically and when this is done, there will be some amazing results.

12—THE LIFE VAPOR
By Clyde Farrar

Mr. Farrar is evidently an expert in his subject. He shows how by proper control it may be possible to change the entire course of human life.

THIRTY MILES DOWN (Book 12)
By D. D. Sharp

What lies far beneath the surface of the earth, still remains quite a mystery to us. Mr. Sharp has erected a rather amazing theory.

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AVIATION NEWS OPERATION

(Continued from page 842)

Develop Mobile Helium Purifier

THE Helium Company, of Louisville, Kentucky, has developed a helium repurification plant of "a mobility hitherto unattained." This plant, to be used by the Goodyear-Zeppelin Corporation, has a capacity of 1500 cubic feet of gas an hour, is mounted on a pneumatic-tired trailer body, and can traverse any terrain which can be negotiated by a truck. The new plant has the advantage of light weight, with the result that it does not have to be transported by railroad.

The plant, according to *Industrial and Engineering Chemistry*, consists essentially of two compressors, one handling air and the other helium. The air compressor supplies air at high pressure to an expansion column, which serves to liquefy a portion of the air, forming a cooling bath at a temperature of 170 degrees below zero Centigrade. The helium compressor forces helium at high pressure through copper coils immersed in the liquid air, with consequent removal of impurities by liquefaction. The helium passes through nearly a half mile of copper tubing, and is finally discharged at a purity of 98%.

Dirigibles Demonstrate Safety

SIX small dirigibles operated by the Goodyear Company carried 6,000 passengers more than 132,000 miles during the year 1929 without injury to a passenger or member of the operating personnel. The ships have been in the air more than 3,500 hours, and have made more than 4,000 landings without so much as jarring a passenger. Although the Goodyear fleet was put in operation primarily to demonstrate the comfort and practicability of lighter-than-air transportation, it has also conclusively demonstrated the safety factor of dirigible flying. In one month the largest ship of the fleet made 109 flights, carried 544 passengers, and was in the air 139 hours 8 minutes. This ship, which carries six passengers in addition to its crew, has a cruising radius of 1,000 miles.

Says 450 Mile an Hour Speed is in Sight

LIEUTENANT - COMMANDER FRANK WEAD, U. S. N. (Ret.), in an article in *Air Travel News* for January, 1930, discusses the interesting question: "How fast will man eventually fly?" Commander Wead is an authority on the subject, and he commanded the victorious U. S. Schneider Trophy Team in 1923, and again in 1924 (when the race was called off.)

According to the expert, a speed of 450 miles an hour in an airplane is certainly in sight. The last Schneider Cup Race was won at a speed of 328.6 miles per hour, and twenty years before Glenn Curtiss won the first International Aviation speed contest at 46½ miles an hour. An eight-fold gain in two decades may not seem unusual; but to realize the tremendous strides that aviation has taken one must realize the trials through which airplane builders and designers have passed.

Airports Advance Rapidly

L. A. NIXON, Editor of *Air Transportation*, states in an article that great strides have been made by airports during the year 1929, and that the prospects for 1930 are very bright. A nation-wide survey conducted by this periodical reveals remarkable progress in airport development. Questionnaires were sent to the managers of all airports in the country, and the results of the survey may be seen by an examination of the averages worked out. The average airport in the United States to-day has 27,520 square feet of hangar space, and is building 20,174 square feet. This total represents an increase over 1929 of about 800%. The present traffic increase over 1928 is 261%, and the traffic increase expected in the next six months is 67%. Each port has about 14 private planes, an increase over 1928 of 314%. The school-owned planes at each port average 7, an increase of 121%. Planes for other purposes average 13, an increase of 178%. The increase in crowds over 1928 is large—117%. The increase in business done by the commercial concerns at the port averages 94%. The average amount to be spent per port for improvement in 1930 is $128,690.

(Continued on page 848)

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T. O'Conor Sloane A.B., A.M., LL.D., Ph.D.

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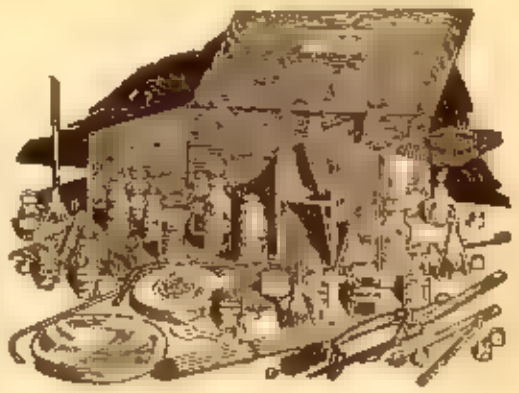

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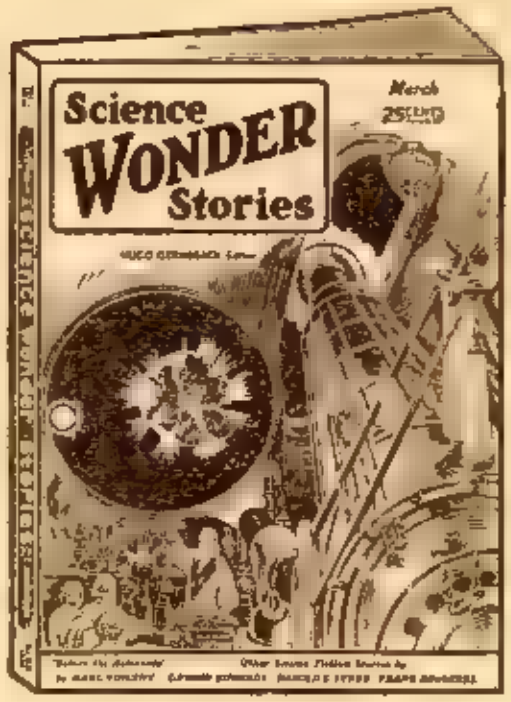

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AVIATION NEWS OPERATION

(Continued from page 847)

Airport Designs Call for Larger Fields

DESIGNS which won prizes in the Lehigh Airport Competition clearly indicate the trend in airport design toward fields that are not only larger than present fields, but are arranged to allow for even further expansion. The winning plan provides for nine runways, making it possible for planes to take off directly into the wind if it is coming from any one of eighteen directions, and at a very slight angle to the wind if it happens to be between two runways. The approach plaza is planned as a park with space for automobiles in a great semicircle along the passenger terminal. This projected building has a waiting room similar to that of a railway station, with ticket and information booths, baggage rooms, restaurant, lunch counter, and offices.

French Plane Spans Atlantic Ocean

SPANNING the distance between Europe and South America in the third non-stop flight of its kind, two airmen, Larre Borges of Uruguay and Lieutenant Leon Challe of France, flew from Seville, Spain, to the coast of Brazil, where their plane was wrecked. The flight was supposed to have ended at Rio de Janiero. However, the fact that a non-stop ocean crossing was made adds this flight to the list of transatlantic flights that have made history.

Air Lines to Meet Rail-Pullman Rates

AS the first bid of the 1930 campaign for increased air travel, airline operators have announced rates equal to the combined Pullman and railroad fares for equal distances. The lead in this movement has been taken by Universal Airlines, a subsidy of the Aviation Corporation. The new rates will apply only to business travel, and mileage scrip books similar to those formerly used on railroads will be sold. The first two lines to use the combination rates center their activities in the south and west, including Mexico in their routes.

Keys Says Flying Risks are Greatly Cut

C. M. KEYS, president of the Curtiss-Wright Corporation, and one of the leading figures in the aviation industry, has stated that in his opinion, three-fourths of the dangers of flight in the early stages have been eliminated. "Within a few years," he says "this form of transportation will be, for many purposes, though not for all, as safe as any other. The fact that the great insurance companies of the world will now write policies at reasonable rates (on airplane travellers) is not based on ignorance, but upon knowledge of what has been done in this direction. The future will tell its own story."

Germany Expects Aviation Expansion

THE leading German aircraft builders are quite hopeful for the year 1930, in spite of the general financial depression which retarded the progress of aviation during 1929. Dr. Hugo Eckener, who set several world's records for airships during the past year, is most optimistic. He has turned his attention to the South Atlantic, and he expects to give the *Graf Zeppelin* a greater glory than it has already achieved. "The problems involved in transatlantic air traffic are gigantic, says Dr. Eckener, "but we propose this year to continue our efforts to lay a solid foundation based on the results of our previous experience and scientific research." These plans include flights to Brazil by way of Spain for the purpose of studying meteorological conditions in the reaches of the Equator which have not yet been traversed by lighter-than-air craft. It may be practical to establish a huge traffic triangle the sides of which will comprise the United States and Germany, Germany and Brazil, and Brazil and the United States.

(Continued on page 849)

AVIATION NEWS
GENERAL

(Continued from page 848)

Air Mail Extended to South America

THE Pan-American Airways organization has extended its air-mail routes from Miami to Rio de Janeiro and Buenos Aires. The new route extends 4,498 miles from Paramaribo in Dutch Guiana through Rio de Janeiro and Montevideo to Buenos Aires. Already 2,782 miles of the route have been inspected and opened by Colonel Lindbergh, who is expected to give his final approval to the rest of the schedule. Over most of the route, two-way radio communication has been established, and mail is flown on regular schedules. Passengers will be carried through to Buenos Aires as soon as possible.

Air Lines Set Mileage Record

COMMERCIAL air transport operators, according to their reports, have flown 25,000,000 miles during the year 1929—a distance equal to one thousand flights around the earth at the equator. One of the factors in the steady increase in air traffic has been the inauguration of such long-distance routes as are operated twice daily by the Transcontinental Air Transport, Universal Air Lines, and Western Air Express, and the lowering of service on the Trans-continental Air Mail route. More than 16,000 passengers were carried during the year.

Says America is not Yet Air-minded

MAJOR GENERAL JOHN F. O'RYAN, head of the Colonial Airways, says that air transportation in the United States will not come into its own for another two years, in spite of the fact that regular air trips are made daily. The general lays the delay of air mindedness to inherited traits and to psychology. He says it is ridiculous to expect people to become air minded in a quarter of a century (the period of airplane development) when they have been earth-bound for hundreds of thousands of years. It may be expected, however, that in two years the American mania for saving time will produce a radical change of attitude.

Institute Studies Vision of Airmen

THE new Wilmer Institute of Johns Hopkins University has undertaken a special study of the effect on vision of flying at very high altitudes. It is hoped that the information derived from the study will aid somewhat in the solution of several aeronautical problems. Dr. Wilmer, who began his investigations during the war, is known for his use of the Henderson-Pierce optical apparatus, which has demonstrated that at high altitudes an aviator's field of vision becomes narrower, even if his ordinary vision is normal. In the case of an aviator who has a visual abnormality, the narrowing of the field of vision at high altitudes is still greater. It has been estimated that a considerable portion of the casualties to aviators during the war resulted from this narrowing of the field of vision.

United States Assumes Leadership in Aviation

ACCORDING to Major Clarence M. Young, Assistant Secretary for Aeronautics, of the Department of Commerce, the United States is unquestionably the leading nation of the world, so far as aviation development is concerned. "We are rapidly assuming leadership in the field of aerial transportation. We have every reason to anticipate in the near future a full realization of air commerce, with all the marvelous possibilities such service will provide for our people in every part of our country."

There has been an enormous increase in mail and passenger air service during the present year, although Europe has been generally considered the leader in passenger service, with such great air organizations as the Lufthansa. The United States is rapidly assuming the leadership, with its own high-developed air transportation companies. In mileage alone, the 1929 total for this country will be close to 16,000,000 miles. Germany's total for 1928 was only 6,303,150 miles.

(Continued on page 850)

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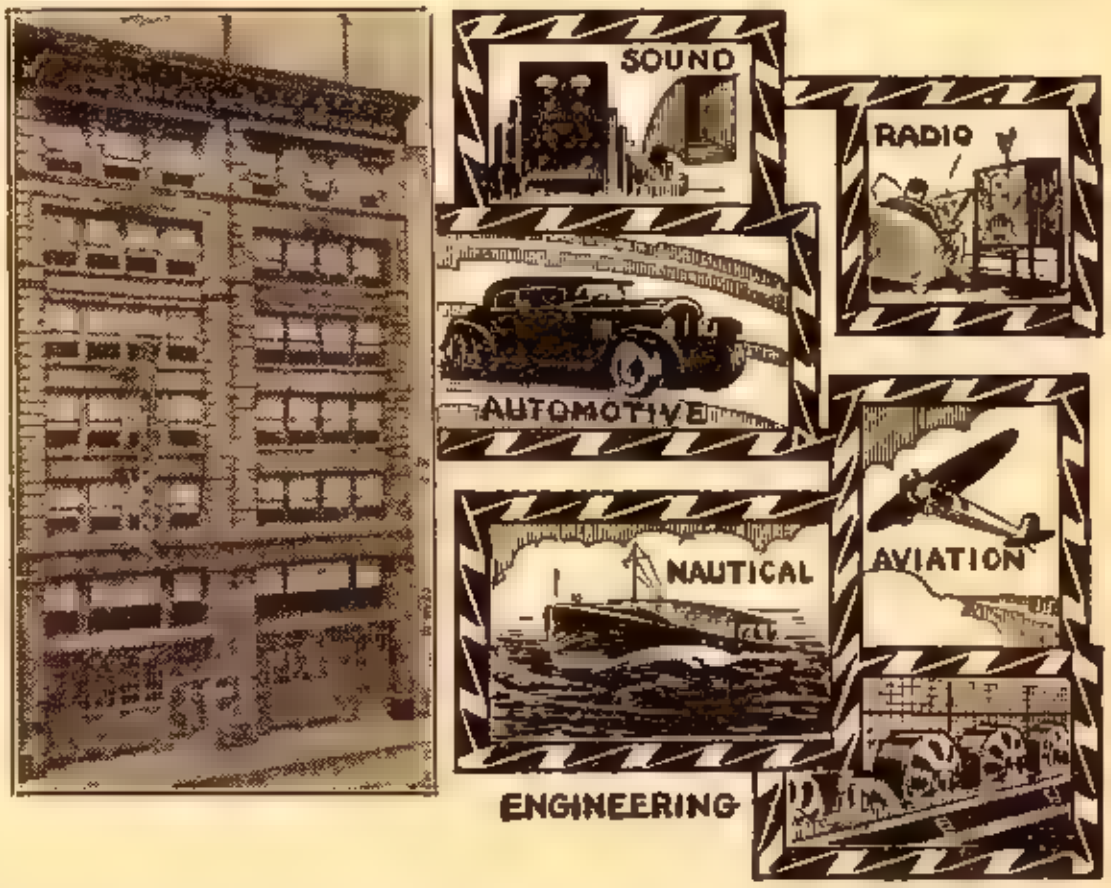

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SEE PAGE 838
3-30

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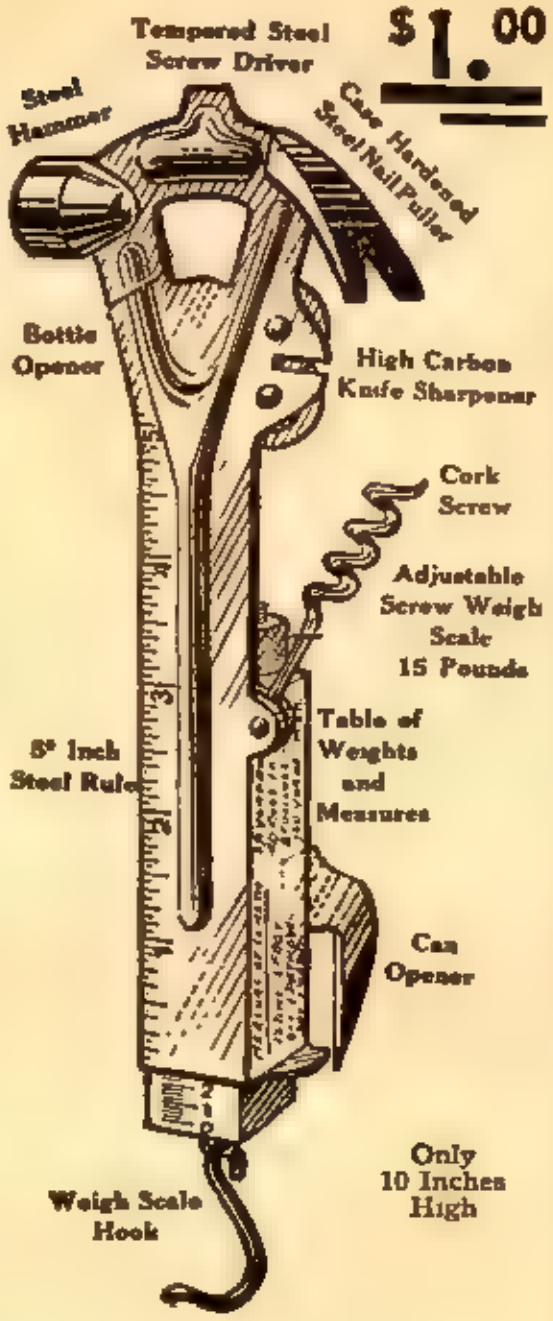

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AVIATION NEWS
GENERAL

(*Continued from page 849*)

Predicts Great Future for New Airships

THE aeronautics branch of the Department of Commerce has expressed its faith in the dirigible as one of the major parts of the aviation of the future. The dirigible, as it is now, has proven its superiority over the airplane for transoceanic flights; but with the development that is constantly taking place, it is certain that its usefulness will increase to a very marked extent. It possesses several advantages which the airplane can never hope to attain, chief among them being the ability to engage in prolonged flights with substantial pay loads. The safety factor, of course, is also very important. The establishment of regular commercial lines for freighters in the very near future will place the lighter-than-air ship on a par commercially with the airplane, and allow it to take advantage of its superior features. Most important of all, however, are the developments in transoceanic and long-distance overland hauls.

Glider Sets New Record

W. H. BOWLUS, glider expert, made a new American record for duration of flight in a motorless plane when he remained in the air above Point Loma, near San Diego, California for 2 hours 47 minutes 13½ seconds, beating his former record by more than an hour and twenty minutes. A favorable wind kept the glider skimming above Point Loma in long steady loops. Such winds are considered of great importance in glider flying.

Predicts Motored Glider Plane

ACCORDING to the Aeronautic Branch of the Department of Commerce, glider flying is likely to develop a plane flown by an engine comparable to the outboard motor used on small boats. The department has issued specifications for glider construction, with special reference to control surfaces as a safety factor.

Glider flying is developing as a sport, and the low price of the machines (from $100 to $700) will give the glider a greater popularity than the more expensive airplane.

Million Glider Pilots by 1933 is Goal

THE glider enthusiasts of the country have started upon a three-year program calculated to increase the number of pilots of motorless aircraft to no less than 1,000,000. The unusual increase in the attention paid to gliding has given a basis for this expectation. Aircraft manufacturers have been interested in the sport because of the incentive it offers to young men who might not otherwise learn to fly. A glider is far less expensive than an airplane, and costs almost nothing to operate. It is regarded as the safest method of learning to fly when it is undertaken under competent supervision.

Classify Pilots Into Twelve Types

THE recent regulation of the Department of Commerce—that every pilot shall be classified in one of twelve groups—will cause a great deal of dissatisfaction and trouble, according to C. B. Allen, Aviation Editor of the *New York World*. To say the least, writes Mr. Allen, "those in authority have succeeded in turning a system that was simple into one that appears to be fraught with complications and red tape. Pilots who pride themselves on keeping abreast of their profession apparently will be bowed down in the future by a multiplicity of licenses."

Under the new ruling the old classification of "private" and "commercial" pilots will be changed to include a weight basis in the license. There are three classifications according to weight, each subdivided into four separate types. The weights are 3500 pounds or less; 3500 to 7,000 pounds, and over 7,000 pounds. The subdivisions in each class are open-cockpit, multi-engine, cabin plane, single motor, cabin plane, multi-motor. Unless a pilot's license shows him qualified for one of the twelve types, that pilot will encounter official difficulties.

(*Continued on page 851*)

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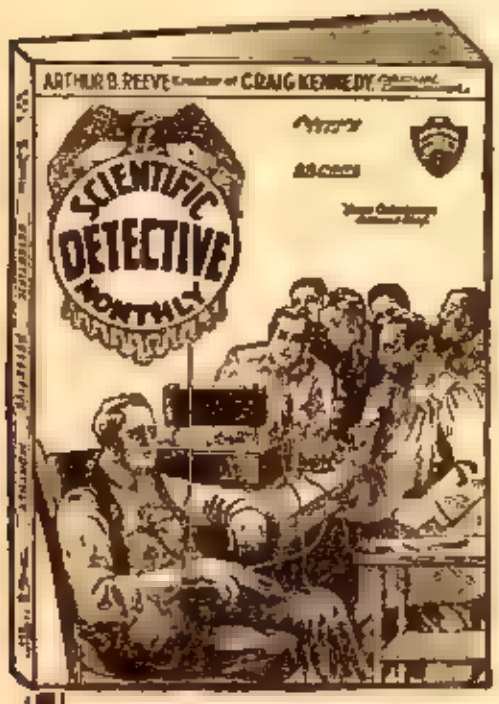

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AVIATION NEWS
GENERAL

(Continued from page 850)

Foreign Pilots Instill Calm

GEORGE GARDNER, writing in the *New York Herald Tribune*, says that foreign pilots are especially "passenger conscious" in that they give a great deal more attention to the peace of mind of their passengers than do the pilots in the United States. While the Europeans are no better pilots than the Americans, their long experience in passenger transportation has given them an unusual grasp of the psychology of the people they carry, with the result that they instill a calm into inexperienced passengers which American aviators cannot duplicate. Foreign pilots, as soon as they get into the air, aim for high altitudes, above cloud banks, and then keep their planes at a constant high speed never varying with the motors where they can be heard. This apparent smoothness of operation instils confidence in passengers. An American pilot, on the other hand, will allow all the motors of a trimotored plane to go dead at once simply for the purpose of draining one gasoline tank absolutely dry before starting on another one. There is no danger, of course, but the effect on the nerves of the passengers is by no means beneficial.

Radio to Aid Parachute Jumpers

CLASSES in parachute jumping at Roosevelt Field, Long Island, receive much of their instruction by radio. As their instructor drops from a plane to the ground he will speak through a transmitter to his class on the ground. Communication is made possible by a broadcasting transmitter with one watt power from a parachute on 2,368 kilocycles.

To Sell Gliders at Cost

TO meet the requirements of a million glider pilots by 1935, the Detroit Aircraft Corporation has acquired Gliders Incorporated. In the belief that it will further the progress of aviation, the company will sell these gliders at factory cost. Gliders which sold formerly for $585 will sell now for $435. The interest in this new sport throughout the United States has centered the attention of the aircraft manufacturers on this new market; and the firm will devote particular attention to the distribution of these motorless airplanes.

Lindbergh Predicts Rapid Gains in Aviation

IN the opinion of Colonel Lindbergh, the science of flying has kept pace with the development of other sciences, and he believes that aviation will progress even more rapidly during 1930. Engineering and structural improvements will place the newest planes far ahead of those already in use. Laboratory development, according to the Colonel, is far ahead of construction, and when actual work catches up with experiment, aviation will become more important than ever. The development of commercial aviation in this country now compares favorably with that of Europe, according to the famous flier, and the opening of the South American service presents unlimited possibilities for transport organizations.

Do-X Compared With R-101

A COMPARISON of the world's greatest flying boat, the Dornier *DO-X*, with the largest dirigible, the *R-101*, has led T. J. C. Martyn, writing in the *New York Times*, to give his opinion that, while the airplane is unquestionably more economical, the lighter-than-air craft has the great advantage of a longer range of operation.

In cost the dirigible passed the estimate of $2,635,000; while the cost of the *DO-X* was [illegible] more than $500,000. As to speed, the airplane is, of course, superior, having a cruising speed of 110 miles an hour and a top speed of 135, while the *R-101* has a cruising speed of 63 miles an hour, with a top speed of 70. Moreover, the flying boat can take off, fully loaded, in a rough sea, and can be launched in any wind lower than a gale. The [illegible] always susceptible to winds, cannot afford to disregard wind velocity to the same extent.

The cruising radius of the ships is the great point of difference; the airplane having a limit of only 600 miles without refueling, while the dirigible can travel 6,000 miles.

(Continued on page 852)

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SCIENCE FICTION SERIES

You'll be interested in learning of the new Science Fiction Series which are now being published—just read page 846 for further details.

AVIATION NEWS
GENERAL

(*Continued from page 851*)

Loening Organizes Air Research Plant

GROVER LOENING, famous airplane builder, has severed his other business connections in order to organize an air research plant, which will specialize in the development of new and advanced designs in aircraft. A new laboratory has been equipped for the purpose of undertaking advanced research in newly created types of planes.

During the past year Mr. Loening has flown approximately 50 different types of aircraft, and he has reached several conclusions concerning the airplane of the future. In his opinion, aviation companies have to pay so much attention to production that they cannot give enough time to research, and his new organization has been formed especially for research which will be undertaken on contract from the government and from private companies. Mr. Loening's ideal plane is one which will allow the student to learn to fly in several days, instead of several months; and will be much lighter, safer, and faster than planes are now.

Subsidies Delay German Air Progress

GROVER LOENING, the airplane manufacturer writing in the *New York Times*, gives his opinion as a business man that the government subsidies for aviation abroad are a serious handicap to the commercial development of flying. He points to the ridiculously low fares charged by the Lufthansa and other organizations—rates as low as 6¼ cents a mile, less than double the fare charged by the railroads of the United States. The cost of operation is three times more than the amounts received through fare; but the fact that the government makes up the difference seems to warrant the continuance of this unbusinesslike procedure.

Safe Flying Laws Cause Confusion

J. C. MARTYN, writing in the *New York Times*, calls attention to the fact that the various state regulations in regard to the safe flying height of airplanes cause a great deal of confusion. In some states no limit is set, and in some there is a minimum limit of 3,000 feet. The lack of uniformity in the definition of the minimum altitude is responsible for the confusion. The question of a standard for a safe flying height must be determined before any progress can be made, and while some experts insist on a minimum of 7,000 feet, others say that the height is to be determined by the gliding angle of the plane. Confusion is caused by the following circumstance. An aviator can violate the federal law by flying over a California city at 500 feet but he does not violate the California law. Moreover, the federal law applies only if the flight is an interstate one. Similarly, an aviator flying at 1500 feet from one state to another is within the federal law, but he is subject to arrest in Massachusetts, where the minimum altitude is 3000 feet.

Long-Range Air Photograph Makes Record

CAPTAIN ALBERT W. STEVENS, head of the photographic branch of the Army Air Corps, has performed the amazing feat of taking a successful photograph of Mt. Rainier at the incredible distance of 227 miles. According to Professor H. H. Sheldon, writing in the *New York Herald Tribune* Captain Stevens who, by his latest achievement, exceeds by fifty miles the old record, also made by himself, displays a great advance in our knowledge of chemistry, physics, and aviation.

By filtering out the short wavelengths at the blue end of the spectrum Captain Stevens manages to cut out sufficient light to enable him to make the photograph. Contrary to popular belief, a certain amount of light must be eliminated in the making of a superphotograph. The short wavelengths of red light must be eliminated simply because they are refracted by particles of vapor in the air, and distort the image.

The making of a telescopic camera with sufficient light gathering capacity represented a definite step forward in optical science. From the chemical viewpoint, the problem was one of increasing the sensitivity of films.

(*Continued on page 853*)

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AW 3

AVIATION NEWS
GENERAL

(Continued from page 852)

New York Has New Air Police Force

NEW YORK CITY'S air police force is now a reality. Twelve pilots and twenty-five mechanics of the police department have finished their training courses. The planes to be used, a Keystone Loening Commuter amphibian, will be devoted mainly to the training of new pilots, while the regular fast patrol ships will probably be the Vought Corsair type of machine. According to Police Commissioner Whalen, of New York, criminals are already using the air. New York police have captured two murderers who escaped from Boston by plane. When Auburn Prison called for gas bombs, the weapons were sent by air. It is expected that every great city of the nation will follow the lead of New York in developing an air police force.

Finds High Wind Six Miles Up

LIEUTENANT APOLLO SOUCEK, American altitude record holder, has encountered a 100-mile wind at an altitude of six miles. This wind would almost double the speed of airplanes flying eastward across the continent at an altitude of 30,000 feet or more. The winds were always westward and seem to blow regularly at the altitude mentioned. They will unquestionably be utilized by west-to-east flyers who will be enabled, by making use of them, to cut their transcontinental flying time almost in half.

Plans 50-Passenger Airship

THE Detroit Aircraft Corporation, which recently built an all-metal airship for the navy, now plans a 500-foot, 100-ton metal craft to carry fifty passengers almost at airplane speed. The new dirigible will have a top speed of 90 miles an hour, which is the usual cruising rate of heavier than air machines.

The ship will be driven by 4800 horsepower motor equipment and will have sleeping accommodations for fifty passengers. The size chosen is one which lends itself most readily to commercial exploitation.

Skyscraper to Have Mooring Mast

THE new Empire State Building, which will rise on the site of the old Waldorf-Astoria on Fifth Avenue, in New York City, is to be equipped with a mooring mast for dirigibles. The new building is projected by a company headed by former Governor Smith, of New York, who was the Democratic candidate in the last presidential election.

According to aeronautical experts, a mooring mast atop a skyscraper is perfectly feasible. The 1300-foot building will have to have special changes made in its steel structure, in order to withstand the strain of a 1,000-foot airship swinging in the wind. The possibilities for making a great building immediately accessible to an airship point the way to the city of the future, in which passengers will disembark from an air liner, and be at their destination in a very few minutes.

Says Air Power Will Dominate the Pacific

GENERAL WILLIAM MITCHELL, writing in *Aeronautics*, states that air power will dominate the Pacific. As a result, our air power in that area means a great deal, for our national safety. This is especially important in view of the fact that the United States is the only great white nation facing an aggregate of 950,000,000 Asiatics.

Traffic by air has changed the lines of communication from one country to another. The routes of commerce and war always follow each other. The key point to the whole Pacific Ocean, according to the general is Alaska, since it is only 52 miles from Asia. Aircraft Mitchell believes, are able to go from continental United States to Asia and return without refueling. This would be of great importance in time of war. Airplanes can fly from New York to Peking in sixty hours by way of Alaska, and in twenty hours more to India or the center of China. With nations in such close proximity to each other the airplane holds the key to future national safety.

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AW-3

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2nd: "I stop at . . .
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THE READER AIRS HIS VIEWS

(*Continued from page 844*)

A Story for Airmen

Editor, AIR WONDER STORIES:

I have read my first copy of AIR WONDER STORIES. I think it is very good.

I want to compliment Mr. J. W. Ruff on his story, "The Phantom of Galon." It sounds more probable than most of the other tales. I would like to see about one thousand stories published that would equal "The Phantom of Galon." Mr. Ruff writes as though he had spent several years in the air service and, as I am an aviator myself, I can appreciate his attitude.

I have read a good many air stories since entering the United States Air Corps; but most of the authors don't seem to know the ways of the air or the ways of the man in the air.

If I can see another story by Mr. Ruff you can count on selling one more magazine.

ERIC D. HENSON,
42nd Squadron,
Kelly Field, Texas.

(Mr. Ruff's close acquaintance with airplanes and airmen is reflected in his excellent stories; and while Mr. Henson appreciates this, other readers appreciate equally the fine plot and writing of "The Phantom of Galon." An author's familiarity with his subject always adds a great deal to his story. We think we can promise Mr. Henson and other interested readers some more of Ruff's unusually good work—in the near future.—*Editor.*)

Our Authors

Editor AIR WONDER STORIES:

I have been a regular reader of your magazine for a long time, and I want to congratulate you upon your choice of authors. Repp and MacClure are hard to beat. Repp is the one I like best, because he writes a different kind of story every time.

I have a special liking for interplanetary stories, although, of course I am interested in the others as well, especially in stories like "Cities in the Air." And by the way, why not get Otis Adelbert Kline to write some interplanetary stories for you? He writes some pretty good stories, and when I say good, I mean GOOD.

Why not publish an AIR WONDER QUARTERLY? I am sure you would sell every copy, and readers would be glad to get it.

EARL HANCHEY,
319 North 5th Street,
Hopewell, Virginia.

(Repp and MacClure and Hamilton are quite popular, as readers of this department know. Every month we receive a great many letters expressing enthusiasm for them. It seems that their vogue grows greater with the passing of time, and that is why we publish their stories—because we always try to give our readers what they want.

As to an AIR WONDER QUARTERLY: We shall have an announcement to make concerning this very shortly. We are certain that our readers will be anxious to know of it. Watch for it.—*Editor.*)

More About Hamilton

Editor, AIR WONDER STORIES:

In your January issue you invite the opinions of your readers in regard to Edmond Hamilton's stories. Altogether, taking into consideration the stories of Hamilton's which I have read in your magazines and in others, I must agree with Mr. Jacoby that they are all alike. Every one of them has the same old plot worked over again. Still, do not by any means stop publishing his stories. When I see Mr. Hamilton's name on the contents page of one of your magazines, I am by no means disappointed. Quite the contrary, for I know his stories make interesting reading, even if they do have the same plot.

Why not get A. Hyatt Verrill or A. Merritt to write some stories for AIR WONDER STORIES? Or at least reprint some of Merritt's. I'll never forget his "People of the Pit." I was so impressed by the story that I rated it higher than any I have ever read. That is still my best science fiction story, and I've read plenty.

H. NAVY L. HASSE,
1126 Trowbridge Street,
Indianapolis, Indiana.

(Mr. Hasse's objections to Mr. Hamilton have been answered, in the matter of the letter he alludes to. Nevertheless, although readers imagine they know what Hamilton is going to do in his stories, they have given him the reputation of being one of our most popular authors—and that is a great deal.

We may have some reprints of the famous science fiction stories. "The Flying Legion" is the first, and it will be followed by other long stories equally good.—*Editor.*)

(*Continued on page 855*)

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Servicing Automobile Radio Installations
By M. J. Sheedy

New Developments in Short-Wave Radio
By Laurence M. Cockaday

Modern Sound Projection
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THE READER AIRS HIS VIEWS

(Continued from page 854)

A Haven from Love

Editor, AIR WONDER STORIES

As one of your readers expressed in your "Reader Airs His Views" section, the illustrations of your authors should be more than rough sketches; in fact they should be real photographs. And furthermore, your editorial remarks on each story should *follow* the story, not precede it, for almost invariably the plot of the story is revealed in your interesting paragraphs. And again, I think the majority of your readers would appreciate a few biographical notes under the photograph of each author. Give more space to your department, "The Reader Airs His Views." It is many times more interesting than a number of your stories. To the multitude clamoring for an AIR WONDER QUARTERLY, I add my voice. Let's have it soon, too.

There are two authors I know of with whose stories your magazine would grow by leaps and bounds. They are Edgar Rice Burroughs, truly the premier of science-fiction, and Ray Cummings, whose worth is proved by his stories.

About the serial controversy: I believe that every magazine should have both. But I do believe that their number in AIR WONDER STORIES should be limited. One each month is entirely enough. For those readers who clamor for so many long stories, I would refer them to your embryo QUARTERLY. And you should keep out short stories from that publication.

Mr Jack P Sickels desires a love interest in your stories. I believe the majority of your readers do not desire such wasted space as is consumed by stories with a "love interest." For such stories, Mr. Sickels may pick up almost any other magazine and find his fill. And at present, AIR WONDER STORIES and your other publications are havens of refuge wherein we can escape ordinary fiction. Take a poll of your readers and let that decide the matter.

Your illustrator Paul is very, very good. There are none better. Let's have a photograph of him and yourself, Mr Gernsback, in the next issue. I would like to become acquainted with you.

I noticed that Mr. Daniel Jacoby cares little for the productions of Edmond Hamilton. For myself, I think Mr. Hamilton has few equals. But one Harl Vincent, in whose praise arise many of your readers, is nothing to write home about, in my opinion.

Ed Earl Repp is fair but no better than many other of your authors.

Keep hold of A. H. Johnson. "The Thunderer" proved his worth.

Neil R. Jones' "The Death's Head Meteor" was excellent. Let's have some more by him. You are uncovering a vast wealth of science-fiction writers.

WALLACE WARDNER,
131 S. Washington St.,
Hobart, Oklahoma.

(The desire for a refuge from the ordinary type of love story is one of the many reasons for the success of our magazine. Mr. Wardner is quite right when he says that a love interest is offered by almost any magazine, but that very few offer a haven from love. We never allow the love story in a science tale to overshadow the science or the action; but we do include it when it materially assists the development of the story. Our world would be quite an uninteresting one were there not the flavor of romance occasionally to remove us from the realm of pure realism.

There has been some discussion of the comparative merits of various authors. This question is still open, and we welcome other expressions of opinion.—*Editor*.)

A Few Slams

Editor, AIR WONDER STORIES:

AIR WONDER STORIES, as a whole, is very satisfactory, yet there are a few faults to find.

One of these is Edmond Hamilton. The much praised "Cities in the Air" proved a perfect flop with me. The style of the story followed the ordinary channel all the way through. Anyone could guess what was coming next after reading the first few lines.

Has Mr. Repp got a monopoly on the magazine? For the last six or seven months his stories have appeared regularly. What is wonderful about Mr Repp? I could name a half dozen of your authors that are better than he is, among them Victor McClure.

Someone (I forget what the name was) wrote in saying that Mr Repp was a second A. Merritt. Excuse me while I laugh. What this magazine needs is an author like A. Merritt. It looks like George Allan England solves the difficulty. His "Flying Legion" looks *good*.

Let's have serials, the longer the better. The *real good* stories are usually long, and to publish them they must be put into serial form.

(Continued on page 856)

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J. D. SNYDER, Publicity Director, Dept. 370
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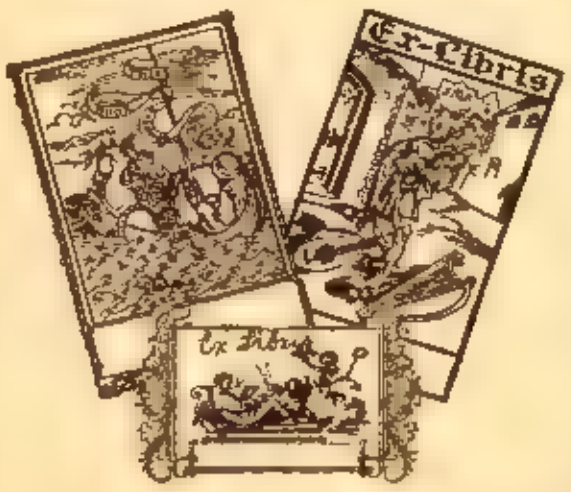

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THE READER AIRS HIS VIEWS

(*Continued from page 855*)

I liked "Airports for World Traffic", but as a general rule I don't think articles like that should be published in a fiction magazine. There are enough scientific articles already.

Here's another voice crying out for Edgar Rice Burroughs, A. Merritt, and others of our old authors.

LEO V. REGNIER,
839 Broadway,
Chelsea, Mass

(This rather severe criticism of our most popular authors will assuredly cause a good many of our readers to come to their defense. We have printed Mr. Repp's stories regularly because they were uniformly good and because we found that most of our readers liked them. The serial by George Allan England, as Mr. Regnier says, is one of the best we have ever published, and we can assure him that it is only a forerunner of other great stories that we will publish in the future. Watch for them. *Editor.*)

IF you enjoy AIR WONDER STORIES you must read SCIENCE WONDER STORIES, its sister magazine. In SCIENCE WONDER STORIES you will find all of the good authors who write for AIR WONDER STORIES, and there are many stories that deal with aviation and, particularly, space flying and inter- the March issue now on all newsstands. Table of contents follows:

"Before the Asteroids," by Hart Vincent

Prize Stories November 1929 Cover Contest

"The Mystery Metal," by H. and Maurice James

"The Insatiable Entity," by Harold S. Sykes

"A Rescue from Jupiter," by Gawain Edwards

"Professor Diel's Ray," by Frank J. Brueckel, Jr

Our Covers

Editor, AIR WONDER STORIES:

I would like to give my ideas on that eternal question of the cover. I have studied every cover of your old periodical and every issue of SCIENCE WONDER STORIES, AIR WONDER STORIES, and SCIENCE WONDER QUARTERLY. I have arrived at the conclusion that the real trouble lies in the background of the cover. Let me explain.

A story describes a world, with a purple sky or whatever the color is, and, if a scene is on the cover, it appears as a terrible green or brown. Witness the cover for AIR WONDER STORIES, January 1930 issue. When I first saw it, I judged the sky to be that of another planet or pinetoid. And upon opening the book, I discovered that the brown sky belonged to our own earth. Again, do you remember the February, 1928 issue of your previous magazine? The cover was weird and yet beautiful. It showed clearly what to expect inside the magazine. If we were able to penetrate beyond the atmosphere, we would see the sky as shown on a green or yellow one. It was the background that attracted me, but I wonder what the result would have been if the cover had been given a glaring color.

My whole point lies in one sentence. Paint the covers with a natural background unless a differently colored world is depicted.

Now that you've finally decided to print England's "The Flying Legion" how about giving us several more of his works such as "Darkness and Dawn." Into the Great Oblivion," "The Afterglow," "The Air Trust," and others, if he has written any more? And now that you print stories about space, why not change the name of the magazine to AIR AND SPACE WONDER STORIES?

ISADORE MANZON,
544 Myrtle Avenue,
Brooklyn, N. Y. C.

(Mr. Manzon does not take into consideration the fact that the backgrounds of our covers blend beautifully with the scenes depicted

(*Continued on page 857*)

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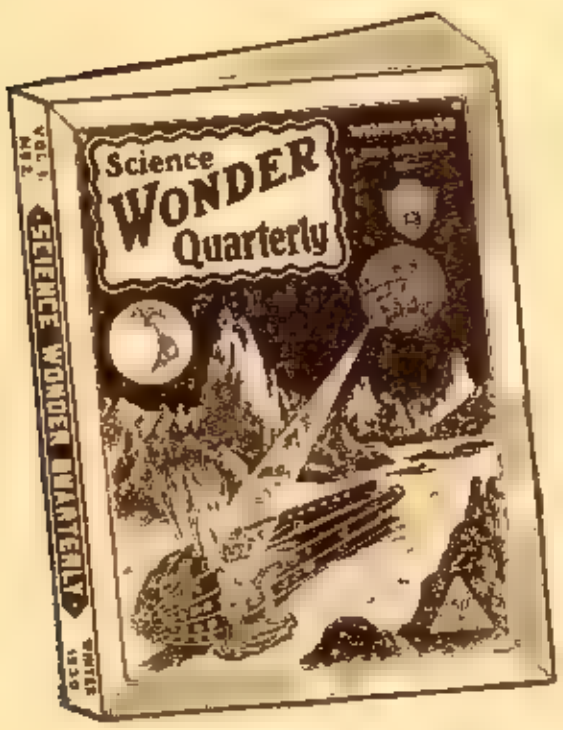

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Name .....

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THE READER AIRS HIS VIEWS

(*Continued from page 856*)

As a matter of fact, they are not always supposed to represent the sky; they are used to furnish a fitting "backdrop" (or the actions illustrated. If we showed the sky as it is, we would either have our covers with a regular blue background, or with a jet black background (in the case of an illustration out in space.) That would be monotonous, and it would interfere with Paul's illustrations, which are in a class by themselves.

England's serial is proving a great success, and we will probably print some more of his work when it is finished. We may have something more to say about this matter in an early issue.—*Editor.*)

Glad to Re-read England

Editor, AIR WONDER STORIES:

It would be unjust to say that either of your fine "twins" is superior to the other in any way. They really both fit under the name of SCIENCE WONDER STORIES. Science stories do not necessarily have to be on the ground, in the fourth dimension, or in the future. Air stories have as much right as any other under the title.

About a *Science Club.* Those who are interested can find the names of fellow enthusiasts in the "Reader Airs His Views" column. They can communicate with them without bothering the magazine.

When I read the first part of Edmond Hamilton's "Cities in the Air," I thought we had another story to remember and re-read; but I was disappointed. In the second part, when the heroes were captured and confined, I knew that they would escape in the nick of time with the important secret, and that they would save everything. And they did—by the width of a flea's eyelash.

I had not expected you to print "The Flying Legion" by England, but I will gladly re-read it. I first read it some years ago, and I am very glad that your new generation of AIR WONDER enthusiasts will have an opportunity to enjoy this fine story.

S. SOHL,
561 West 193rd Street,
New York City

(Mr. Sohl's recollections of "The Flying Legion" are indicative of the power this story has exercised over a period of years. No one who has ever read it can forget it, and those who regret the fact that they did not keep the story when they first read it, years ago, are happy of the opportunity to see it again in print.

In spite of what Mr. Sohl says, there *is* a distinction between SCIENCE and AIR stories, the difference being, as everyone knows, that in AIR WONDER STORIES we are able to concentrate upon one particular phase of science, and to give the latest theories and developments in it. The article on rockets by Max Valier, for example, in the February issue, is of unusual importance and while we would not have room for it in SCIENCE WONDER STORIES, it is quite welcome to the readers of AIR WONDER STORIES. In this way we are able to keep our subscribers informed of the latest developments in every field of science, and to give them twice as many stories as they would have otherwise. We find that most of them are enthusiastic over both magazines.—*Editor.*)

Are We Getting Stale?

Editor, AIR WONDER STORIES:

I have read your magazines for a long time. You have an excellent periodical in AIR WONDER STORIES; but to me it is beginning to get "stale." This is probably because I have read so many stories of the same type.

I have read of beings of different density, gaseous, liquid, and metal, who lived in different environments—the ultra-universe, the [illegible] water, air, beneath the world's crust, on other planets, and different temperatures, and under other conditions. Stories of wars and of manufactors are most common. I would like to see less of them. Interplanetary stories are next in number, and I have not read a really good one since "The Warriors of Space." Stories like "The Alien Intelligence" are welcome because they deal with sciences of which we know little or nothing, and are therefore more interesting.

"Men with Wings" is the worst story you have published so far, because it is improbable that the wings could have grown from the shoulder blades. Please publish more stories like "The Second Deluge," "The Moon of Life," "The Second Swarm," "The Moon Pool," "The Retreat to Mars," and other stories by Keller and Verrill. "The Flying Legion" promises to be great.

GORDON C. SEAVEY
187 Pleasant Street, Arlington, Mass.

(*Continued on page 858*)

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THE READER AIRS HIS VIEWS

(*Continued from page 857*)

(Although our scientific periodicals offer a field practically unlimited, we can understand how a reader would begin to consider them "stale" after some time. Nevertheless, this feeling always wears off and they return to us with greater anticipation than ever before. Perhaps Mr. Seavey reads his magazines all at once, and does not take sufficient time to digest each story. Even we editors, accustomed as we are to reading hundreds of A. W. and SCIENCE WONDER manuscripts every month, experience a decided thrill whenever we read a good story.

There is a good deal in what the writer says concerning the science of which we know little. We are always trying to get authors to develop new ideas in these fields, and, if we may say so, we think we have succeeded rather well.—*Editor.*)

No Comparison with Ordinary Fiction

Editor, AIR WONDER STORIES:

Perhaps I'm bothering you, but then again it may be that letters are a help to you, especially when they come from those whose work you are carrying into the future. I've decided to write you after reading each issue. This, of course, is for comparison only, since, in my opinion, ordinary fiction *can't* be pitted against your stories. As far as I am concerned, your work is far better than regular fiction at its best.

The article "Airports for World Traffic" is a bit out of my line, as I know nothing but "heavier-than-air ships. It is well written and sounds good, and I was glad of the "dope" it contains.

"The Storm Buster" by Repp was very entertaining. I don't know about the calming of the elements, but his aerodynamics sound all right. I don't think I've ever caught Repp in anything very unlikely along that line in any of his stories. "The Death's Head Meteor" is also outside my line, but it is quite interesting. "The Thunderer" I considered below your usual standard. In the first place, a helicopter such as the villain uses would be almost an impossibility. The slipstream from his vertical propellers would strike fairly on his back, causing a reversed lift to operate against the lifting force of his propellers. Result? Granting that he could get off (which I don't believe) his rate of climb would be far, far, below that of an ordinary plane of reasonable efficiency. His thrust would all be straight up—but he would be in much the same position as a man trying to lift himself by his own bootstraps. Also—so *much* power would be lost per pound of weight that he'd have very little, if any, left to carry him *forward.* Hence the plane would run off and leave him! His one advantage, then, would be the ability to stand still in the air and maintain his altitude. No—if we're going to be futuristic, let's go beyond what has been long since discarded and invent—say—an anti-gravitational screen. If we *must* have more speed, let's use a rocket. The story, on the whole, was poor only in comparison with the balance of this particular issue, which I consider well above even your average.

E. J. GREDING,
Jackleg Pilot and Airplane and Motor Mechanic
Dallas, Texas.

(Mr. Greding's views are of unusual interest. We receive many letters from professional flyers and airplane experts who admit that they cannot find anything wrong with Mr. Repp's air stories.

The helicopter described in "The Thunderer" has propellers in the usual positions, as well as helicopters, if the cover illustration by Paul means anything. And Paul is a master at drawing machines that would work. However, the Cierva auto-gyro works on the same principle; it has a propeller mounted horizontally above the wings which is larger than the wings themselves; and it has flown quite well in several tests. Apparently the slipstream from the helicopter propeller does not interfere with its operation to any extent. This matter of the slipstream is, at best, a minor point. And if Mr. Greding will study Paul's illustration closely he will see that the vessel is built in the shape of a dirigible; and that although it traveled much faster than any dirigible ever dreamed of it might work by means of lifting gas.

The gravitational screen is a theory which has not yet been established by any scientific experiment, yet the idea has great possibilities.

We are glad to receive letters from airmen who wish to express their views on the mechanics of our air stories. We will be especially pleased to hear more of the controversy on aircraft which cannot fly—provided these aircraft are described in our stories, and the correspondents think them impractical.—*Editor.*)

(*Continued on page 859*)

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How to manage men
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THE READER AIRS HIS VIEWS

(Continued from page 858)

Twelve-Month Serials

Editor, AIR WONDER STORIES:

I have been reading your twin publication, AIR WONDER STORIES and SCIENCE WONDER STORIES, since they first came out. I have also been reading different letters in the AIR WONDER STORIES about the different viewpoints on serials. Well, what I say is that I'm for longer stories and longer serials serials that will last a year or more. When a serial ends at an exciting point, it stirs the reader's imagination as to what the next part will be about.

I would like to see a sequel for "The Flight of the Eastern Star," with Tom Rodman in the new ship, "The Comet."

MAURICE SIEGEL,
1305 South Spaulding Avenue,
Chicago, Illinois

(Usually our readers want their serials short, so that they may not remain in suspense for too many months. Now we are really afraid, Mr. Siegel, that stretching the suspense over a year might permanently age our readers. We can't risk that. If Mr Siegel will consult the list of SCIENCE FICTION CLASSICS which we will issue from time to time, he will find there many full novel-length books which will give him all the satisfaction of a year-long serial.—*Editor.*)

IF you have not as yet seen the WINTER SCIENCE WONDER QUARTERLY

WATCH FOR THE SILVER COVER

Be sure to procure a copy immediately from your newsstand.

This magazine specializes in interplanetarian science fiction and the Winter issue contains the following marvelous stories:

"The Moon Conquerors," by R. H. Romans

"The Osmotic Theorem," by Capt. S. P. Meek, U.S.A.

"Into the 28th Century," by Lilith Lorraine

"Underground Waters," by A. C. Webb, M. D.

Do not miss the Winter issue now on all newsstands

Magazines for Serials and Short Stories

Editor, AIR WONDER STORIES:

The stories in your last issue were all good. Keep on having sequels. I like them very much. As for serials, if they are good, keep on with them. I don't like them myself, but I would rather read a fine story in two or three parts than not read it at all.

As SCIENCE WONDER STORIES and AIR WONDER STORIES seem to be run with such similar stories, why not have one chiefly serials and one chiefly short stories? Readers could then take their choice.

Paul's illustrations are very good. For a long time I was puzzled as to whether this is a given name or a surname, but now for the first time I saw his full name on the editorial page.

ARTHUR J. C. WILSON,
Box 350, 43 King Street,
Windsor, Nova Scotia.

(Mr. Wilson's suggestion for two magazines—one for serials and one for short stories—would solve a certain purpose. The difficulty lies, however, in the fact that a good magazine must be balanced; and if we devoted, say SCIENCE WONDER STORIES, to serials alone, many readers who like science stories would be disappointed simply because they do not like serials. The same would be true if we devoted one magazine to short stories alone. We hope Mr. Wilson sees our point. Although the serial question has caused a certain amount of controversy, it is not so important that readers would determine their preference for a magazine on it. However, the free and open discussion that we have allowed has amply served its purpose.—*Editor.*)

(Continued on page 860)

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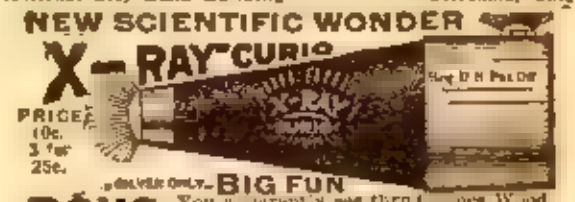

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THE READER AIRS HIS VIEWS

(Continued from page 859)

Future Flying

Editor, AIR WONDER STORIES:

I see that most of your readers write in to give their views on the serial controversy, or on the question of a QUARTERLY, or on the matter of a science club. Very few of them have said anything of the preposterous stories you publish. The stories I refer to are those dealing primarily with space flying and interplanetary flight. Such a story for example, as "Liners of Space" in the February issue, is just a waste of wasted paper. In the first place, the author does not explain in any very convincing manner how the space ships managed to fly from planet to planet as easily as we fly from country to country. He speaks of electrically controlled rocket motors." I would love to see one. I realize that a space rocket is not an impossibility, but a rocket motor is another thing, and one controlled by electricity is still another. According to the latest reports, rockets are to be driven by liquid fuel, and not by power, and I may add fuel experts fly across the English Channel in a liquid fuel rocket plane. Very well. But it is a far cry from a rocket plane like that to a space ship powered with the rockets described by Mr. Vanny. I confess that I can't see it at all, although I pride myself on my broad-mindedness, and on the fact that I manage to keep well abreast of the latest developments in science.

This isn't an expression of dissatisfaction with your magazine, it is simply the expression of a honest opinion. Certainly I manage to conceive of something like the machines described by your authors, but at times I just can't swallow them, and this time I thought I would say something about it.

I suppose I shouldn't pick on one story to illustrate what I mean, but the fact is I didn't like "Liners of Space" at all. It simply takes an old situation and puts it into a new setting. It takes the story of the hero, the heroine, and the mad inventor and throws it way out in space. Otherwise it is the same old thing, and I am sure everyone knew what would happen before it happened. And what about those "tin tubes?" One space car carrying a lot of others, like an ocean liner carrying lifeboats. It's really too much.

H. J. HAINES,
[illegible], Nebraska.

(Mr. Haines, and others who cannot "swallow" our conceptions, may feel perfectly at liberty to express their opinions. That is why we run these columns. We may say, however, the rocket motor has a much more known as a jet motor which sets of the various cylinder explosions at the proper times. In an ordinary operated rocket ship, a similar mechanism would control the power explosions of the various liquid explosions in the combustion chamber or chambers.

As to the rest of Mr. Vanny's story, we prefer not to express any opinion. Other readers may wish to answer Mr. Haines, and we will be glad to consider their letters.—*Editor.*)

Another Helicopter

Editor, AIR WONDER STORIES

Leave out unsuitable short stories and unhumorous humorous stories. And by the way—take my congratulations to Paul for his great art work. And the same to you for pepping up the "Aviation News of the Month." It was actually falling apart from age. And something else again about Paul—his illustrations are so tempting that I have decided to buy [illegible] Wonder Stories and the Science Wonder Quarterly. His art in the Winter QUARTERLY was irresistible.

To correct the "Aviation Forum" in the January issue, I will state that there is another helicopter other than the Vanny. It is the Pescara helicopter and is quite different from the Vanny, in that it has eight wings each with two propellers on each side. The wings are operated independently of the engine.

I will change the subject again to say that many AIR WONDER and SCIENCE WONDER imaginings of yesterday are facts today. Take the Armstrong Sendrome, for instance. It is an excellent example of what I mean.

RONALD EMMET,
601 West 173rd Street,
New York City.

(We are grateful for the [illegible] Mr. Sanders is doing the [illegible] It looks as if it will be [illegible] We must say that in twenty years the Armstrong Sendrome will become as commonplace to the people of that day as motor cars are to us. We must what we have consistently stated, that despite the extreme [illegible] of the future we believe the future will give us marvels entirely surpassing anything we now have. The AIR WONDER QUARTERLY is coming closer and closer to reality. Watch for an announcement. *Editor.*)

CLASSIFIED ADVERTISEMENTS

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SONG POEM WRITERS. "Real proposition. Hibbeler, D153X, 2104 N. Keystone, Chicago.

AVIATION FORUM

(Continued from page 843)

A Gravity-Resisting Metal

Editor, Aviation Forum

Is there any known metal which of its own accord will resist gravity, and if so, what are its properties?

CHARLES FANZLOW,
Buffalo, N. Y.

(There is no known metal which will resist gravity of its own accord. But scientists have carried on experiments with substances which seem to show some sort of resistance to gravity. In the article "Can Man Free Himself from Gravity?" (which appeared in the February issue of SCIENCE WONDER STORIES), Dr. Wolff refers to the work of Professor Charles Brush, who has discovered a silicate, of a composition known only to himself, which falls more slowly than any other substance. The usual acceleration of a body falling freely in a vacuum is 32.2 feet per second, or 386.4 inches. Dr Brush's silicate is accelerated at 362.778 inches per second—a loss in acceleration of almost two feet per second.—*Editor*.)

On Meteors and Meteorites

Editor, Aviation Forum:

As one of your authors, perhaps I may be privileged to make some criticism of another of your authors.

I have read Neil R. Jones' story of "The Death's Head Meteor" in the January issue of AIR WONDER STORIES and would like to correct one or two of his assertions about meteors and shooting stars.

The facts of meteoric phenomena are not completely known, but we do know that meteors and meteorites are alike in substance, and differ only in size, as we have stated. Both follow orbits, and both may be considered parts of disintegrated comets. As to the meteorites having orbits between the earth and the moon, we do not know of any. The meteors and meteorites have an orbit far out into the solar system, as shown in the accompanying diagram, many times the distance of the earth from the sun. This orbit intersects the earth's orbit at regular periods, and causes the meteoric showers which are always thickest in the middle of November.—*Editor*.)

Rocket Flights

Editor, Aviation Forum:

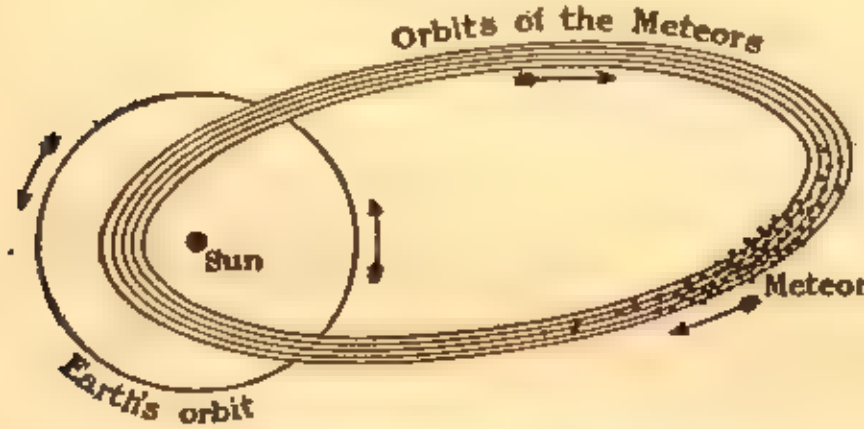
1. In going through space at the rate of eight miles per second, wouldn't a space rocket get so hot that it would melt?

2. How long do you think it will be before earth men are able to go to Mars or to Venus?

KENNETH W. ARCHIBALD HUCKINS,
1849 Challen Avenue, Jacksonville, Fla.

(A body becomes hot while in motion only when its action causes friction. If the rocket were flying through an atmosphere at a speed of eight miles per second it would unquestionably become very hot, because of the friction. Meteors travelling at twenty miles a second burn up in our atmosphere. But in outer space there is no atmosphere; there is only vacuum. So where there is no air, there is no friction.

2. It is difficult to name an approximate



Illustrating the orbit of the meteors in relation to the orbit of the earth. (From "The Sun, the Stars, and the Universe," by William M. Smart. Longmans, Green & Co.)

He tells us, "The meteor struck upon the darkened side of Mars. While still high in the air, it exploded with a loud concussion which was heard for hundreds of miles, the masses of scattered fragments catapulting themselves into the quivering ground, throwing up a cascade of dirt and rocks, flattening trees and leaving great craters."

In the first place, when a meteor comes within range of the atmosphere of a planet, it turns to an almost unimaginable heat, afterward exploding into a gas. The heat turns the meteor a bright color and shows it as a shooting star, but it never reaches the earth's surface or the surface of any other atmospherically protected planet. Mr. Jones has confused meteors with meteorites which do strike the planets, regardless of the atmospheric protection.

Meteors and meteorites are entirely different in structure and in their orbits. Meteors are comets that have died, while meteorites are volcanic in structure. Meteorites have an orbit thought to be somewhere between the earth and the moon, although such an orbit has never been discovered. The meteors have an orbit similar to that described by Mr. Jones—around the sun and out somewhere between the orbits of Mars and Jupiter, crossing the earth's path as well.

EUGENE GEORGE KEY,
2845 Milwaukee Ave.,
Chicago, Ill.

(While Mr. Key is right in some respects, his information concerning meteors is not thorough. As a matter of fact, meteors *do* explode, and we have photographs of these explosions. It is true that most meteors burn up when they come within an atmosphere as dense as that of the earth; this is because the orbital speed of the earth is 18½ miles per second, and the speed of the meteors at least 25 miles per second; a head-on collision with the atmosphere gives relative speed of 43 miles per second and the result is ignition by friction. Meteorites are simply meteors which are large enough to resist the effects of friction and reach the earth's surface. While meteorites are also ignited, and turn partly to gas, they are large enough to retain some of the metallic substance, which is the part we find.

period of time before interplanetary flights will become possible. At the present time, Professor Goddard is preparing to send a rocket into space. Much depends upon this flight and upon those which will follow it. Before we can travel such vast distances as the millions of miles between the earth and its sister planets, we must first learn how to traverse a space relatively small—like that which separates the earth from the moon. Until the results of the experiments are worked out, therefore, it is hard to give any answer.—*Editor*.)

What Causes Pressure During Acceleration?

Editor, Aviation Forum

I have read "The Shot Into Infinity" in your SCIENCE WONDER QUARTERLY and enjoyed it very much. There's one thing that I don't understand and perhaps others of your readers do not, also, and that is: What causes the pressure on the body during the acceleration of a body (such as the rocket)?

ARTHUR JAFFEY,
3751 W. 16 St.,
Chicago, Ill.

(It takes force to overcome a body's inertia, or its inclination to remain at rest or keep moving with a uniform speed. Now when a body is accelerated, the force that puts it forward is distributed through every particle of that body (one molecule puls on the next). Now suppose a person is seated in a chair fixed to a vehicle, which is moving with uniform velocity and is suddenly accelerated. The force of the acceleration is transmitted to the chair which tends to move forward. Due to our inertia, we tend to continue moving with uniform velocity. Therefore, as the chair moves forward it presses against our back. This is equivalent to establishing a new center of gravity at the rear of the car (everything tends to move toward the rear as the car moves forward). Thus, on the surface of the earth, the force acting on a person being accelerated 32 feet per second each second is equal to his own weight.—*Editor*.)

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BOOK REVIEWS

PRACTICAL FLYING, by Byron Q. Jones. 210 pages, illustrated, stiff cloth covers, size 6 by 8¼. Published by the Ronald Press Company, New York. Price, $3.00.

Practical Flying, written by a major in the United States Air Corps, is a training manual for airplane pilots. It attempts to do away with the mystery that surrounds flying, and to make the reader realize that an airplane is a vehicle, like any other, and that it can be mastered like any other. Major Jones devotes the early part of his illuminating and well written volume to the questions "Can I learn to fly?" "What qualities are necessary for a pilot?" and so forth. The author goes into flying in detail covering every step of the training course. His own experience as a teacher of flying has given him a deep insight into the problems and attitude of the student, and because of this his book is particularly valuable.

THE LONE SCOUT OF THE SKY, by James E. West, 275 pages, illustrated, stiff cloth covers, size 5¼ by 8. Published by the Boy Scouts of America, New York. Price, $1.00.

James E. West, Chief Scout Executive of the famous Boy Scouts of America, has written the ideal boys' book—one which holds a great deal of interest for older people as well. The story of Lindbergh has been told and retold any number of times but *The Lone Scout of the Sky*, (containing contributions by Dr John H. Finley, Commander [now Admiral] Richard E. Byrd and Clarence Chamberlin) has features which distinguish it from other accounts. The number of photographs, cartoons, and drawings included in the volume, the account of "40,000 miles with Lindbergh," and complete instructions for making a flying model of "The Spirit of St. Louis" give it a dramatic interest and instructional value not usually attained by volumes of biography.

WEATHER AND WHY, by Captain Ienar E. Elm, Air Corps Reserve, U. S. A. (Ret). 109 pages, illustrated, stiff cloth covers, size 6 by 8½. Published by the David McKay Company, Philadelphia. Price, $2.00.

Captain Elm, from his experience as a teacher and flyer, has compiled in this book a great deal of information which has proved useful in presenting the study of the weather to those interested in it in connection with the practical side of aeronautics. The volume is not written from the standpoint of the professional meteorologist, but from the viewpoint of the flyer who, while not a specialist in meteorology, has found the application of the principles of that science a vital necessity to success in piloting a plane.

Weather and Why is suitable as a textbook for ground schools, but at the same time the average person will find it intensely interesting for the reason that it tells a great deal about wind and weather, about the causes of various types of weather and air pressure, and about the various methods for predicting what sort of atmospheric conditions will prevail.

AVIGATION BY DEAD RECKONING, by Captain Inear E. Elm, Air Corps Reserve, U. S. A. 120 pages, illustrated, stiff cloth covers, size 5 by 7½. Published by the David McKay Company, Philadelphia. Price, $2.00.

This book on avigation (aerial navigation) by a well-known flyer and President of the Elm Aircraft Company, is a concise practical work of instruction to meet the requirements of a text book in avigation for ground schools. It is very clear in its explanations, and will enable the average student to master avigation by dead reckoning in a very short period of time. "Dead reckoning" is the method of flight Colonel Lindbergh used in his flight to Paris, and consists in finding one's direction from a map. It is merely the calculation of the estimated position of the plane by the application of a correction for wind drift to the course as it would be theoretically in a calm.

An important feature of the volume is the fact that it parallels the instruction given in avigation to army pilots. It contains a description of the various instruments used, and of the methods for finding wind velocity and direction, for taking one's bearings and so forth. For the practical flyer this book is one of the most useful of its kind.

THE NAVIGATION OF AIRCRAFT, by Logan C. Ramsey, Lieutenant, U. S. Navy. 234 pages, illustrated, stiff cloth covers, size 5¾ by 8½. Published by the Ronald Press Company, New York. Price, $4.50.

Lieutenant Ramsey, the author of this work, is an acknowledged authority on aerial navigation. His book covers the most neglected branch of the science of aeronautics—dead reckoning, which in the past has been given a secondary place by experts trained in astronomical reckoning and maritime navigation. Astronomical observation, as far as it concerns aerial navigation, has a very limited field. Dead reckoning is of the utmost importance, and Lieutenant Ramsey gives an exhaustive and instructive treatise on the subject.

The author gives a comprehensive introduction to his subject, and then goes on to treat in detail, and with the aid of many drawings and photographs, the maps, instruments, and accessories used in navigation; the compass, dead reckoning and plotting, the effect of wind in dead reckoning, the determination of the wind, piloting, aerial astronomy, the instruments used in aerial astronomy, celestial observations, and the application of aerology to navigation. An appendix giving the value of refraction and the map symbols used in aerial navigation completes a most informative and useful volume.

OPPORTUNITIES IN AVIATION, by Walter Hinton. 255 pages, illustrated, stiff cloth covers, size 5¾ by 8¼. Published by W. W. Norton & Co., Inc., New York. Price, $3.00.

Walter Hinton, the author of *Opportunities in Aviation*, is one of the best known airmen of the present time, and he is generally regarded as the first transatlantic pilot, for it was he who piloted the *NC-4* across the Atlantic in May, 1919. He has made other historic flights, and he is now president of the Aviation Institute of the U. S. A. His book tells one all there is to know about aviation as a business. It tells what is happening in every branch of the industry, what the various jobs are that deal with the aviation business, what one may expect when he is learning to fly. It tells also of transport operation, aviation in exploration and aviation as a part of the life of the world. Most important of all, it is a practical book not a theoretical one, and deals with the salaries various mechanics and pilots may expect to receive. One of the interesting features of the book is a chart which shows the relatively short period of time necessary for flight training, as compared with the training needed for other businesses and professions. Aviation has not only opened up new markets for business and manufacture, it has opened up new fields of activity for the young men who will be the leaders of to-morrow.

THE AIRCRAFT HANDBOOK, by Fred H. Colvin and Henry F. Colvin. 690 pages, illustrated, flexible leather covers, size 5 by 7½. Published by the McGraw-Hill Book Company, New York. Price, $5.00.

This comprehensive book tells almost everything that one can possibly wish to know concerning the construction and care of planes, motors, and aircraft instruments. It appeared first in 1918 but since so many developments in aviation have taken place since then, it has been rewritten, and the information contained in it has been brought up to date. The chapter headings give but a bare outline of what is in reality a splendid addition to any aviation library. "Simple Airplane Theory", Types of Airplanes", Rigging and Servicing the Plane "The Airplane Engine "Trouble Shooting for Airplane Engines", "The Propeller", "Engine and Plane Accessories", "Aircraft Instruments"; "Airplane Construction"; "Materials for Aircraft Construction "S. A. E. Standards"; "Airships or Dirigible Balloons"; "Construction of Airports", "Air Commerce Regulations"; "Nomenclature for Aeronautics."

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Fine imported magnetic compass. ACCURATE Pocket size. Invaluable for hikers, automobilists. Often saves lives. Use it to tell live electric wires; make your own galvanoscope. Fully nickel plated. The actual article is about one-half again as large as illustration shown.

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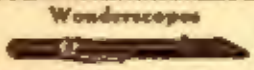
With this little instrument you apparently see through your hand, cloth, wood, stone and other objects. See the lead in a pencil, the stem hole in a pipe, the bones in your fingers. An amazing optical illusion that no one has ever satisfactorily explained. Startle the girls by showing them what this tube can do and let them imagine the rest.

No. 8590. X-Ray Tube. Prepaid.. **10c**

Wonderscopes



NEW! Greatest pocket microscope invented. Looks like a fountain pen and ACTUALLY MAGNIFIES 25 TIMES. Hair looks as big as a rope. See the pores in your skin. Has slide adjustable lens. For home, laboratory or shop. Full black enamel with clip. Its size measures 3"x¾". Must be seen to be appreciated.

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No. 8652 Wonderscope B—Same as above but adjustable to the amount of light available. Prepaid **$1.35**

Luminous Paint

Make your own luminous articles. Paint watch and clock hands, electric light switches, push buttons, keyholes, house numbers, etc. 1,000 uses. Articles treated stand out brilliantly in dark. The darker the room, the more brilliancy.

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No. 8508-A Large Size **$1.00**

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The real article! Conceal nose blower in your handkerchief and blow into instrument while you pretend to blow your nose. Everyone stops and looks at you. There never was a terrible noise like it. Keep it up as long as you like.

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Bluffgun

Bluff your friends with this gun. Made of compositon metal handsomely nickeled. Exactly same size, weight and shape as real article. Fine to bluff burglars. Used also as desk paper weight. Size of this gun is 6¼" long and 3" wide.

No. 8505 Bluffgun. Prepaid. **65c**

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A real Cartesian diver—Can you explain how it works? A little glass imp placed in a bottle of plain water and sealed with special rubber cap, dances up and down in the bottle at your will. Will perform unique antics. An interesting, amazing and scientific novelty. Bottle 4 inches high.

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A pretty and unique watch charm, ¾"x1". Exact duplicate of real Opera Glasses. Powerful lenses that clearly magnify the view. Assorted views, scenic and French actresses. Fitted with ring to attach to watch chain. 2 VIEWS to each charm.

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No. 8706. Magic Set. Prepaid.
No. 8707. Card Tricks. Prepaid.
Or all three numbers. Prepaid **25c** **65c**

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No. 8647. Microscope. Magnifies 90 diameters. Prepaid **$6.75**

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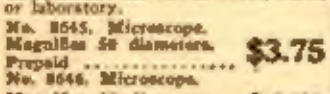

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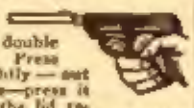
No. 8508 Pistol **$1.20**

No. 8509A Set of 25 Cartridges, by express collect **25c**

Cigaret Gun



NEW. Actually shoots cigarettes. New improved double action model. Press the trigger lightly — out shoots a cigarette—press it again, back flies the lid revealing it a cigarette case. Looks like a real automatic. Made entirely of metal, with oxidized stocks, barrel and fittings. The same size as the real article, and weighs but 12 ounces.

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For the astonishing small sum of 25c you can learn telegraphy. Any wide awake boy or girl can learn the telegraph codes with this little outfit within from 30 to 60 days. Gives loud signals perfectly—nothing to wear out. No batteries. The instrument consists of hard fiber base, mechanical sounder and telegraph key knob. Screw to table or carry it in pocket. Guaranteed to give exact reproduction of telegraph sounds just like regulation sets. We also furnish free a set of telegraph codes as shown, and full instructions of how to learn telegraphy.

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A full deck of 53 linen finish cards that you can use for play or magic. Deck is cut tapered, one end narrower than the other. Draw away card picked from the deck—and hundred of other amazing feats. Full instructions for performing 10 different tricks. Startle and entertain your friends. No skill required.

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Can You Do These Things?

Lift 200 lbs. or more overhead with one arm; bend and break a horseshoe; tear two decks of playing cards; bend spikes; chin yourself with one hand.

CAN you do any of them? I can and many of my pupils can. It is remarkable the things a man really can do if he will make up his mind to be strong. It is natural for the human body to be strong. It is unnatural to be weak. I have taken men who were ridiculed because of their frail make-up and developed them into the strongest men of their locality.

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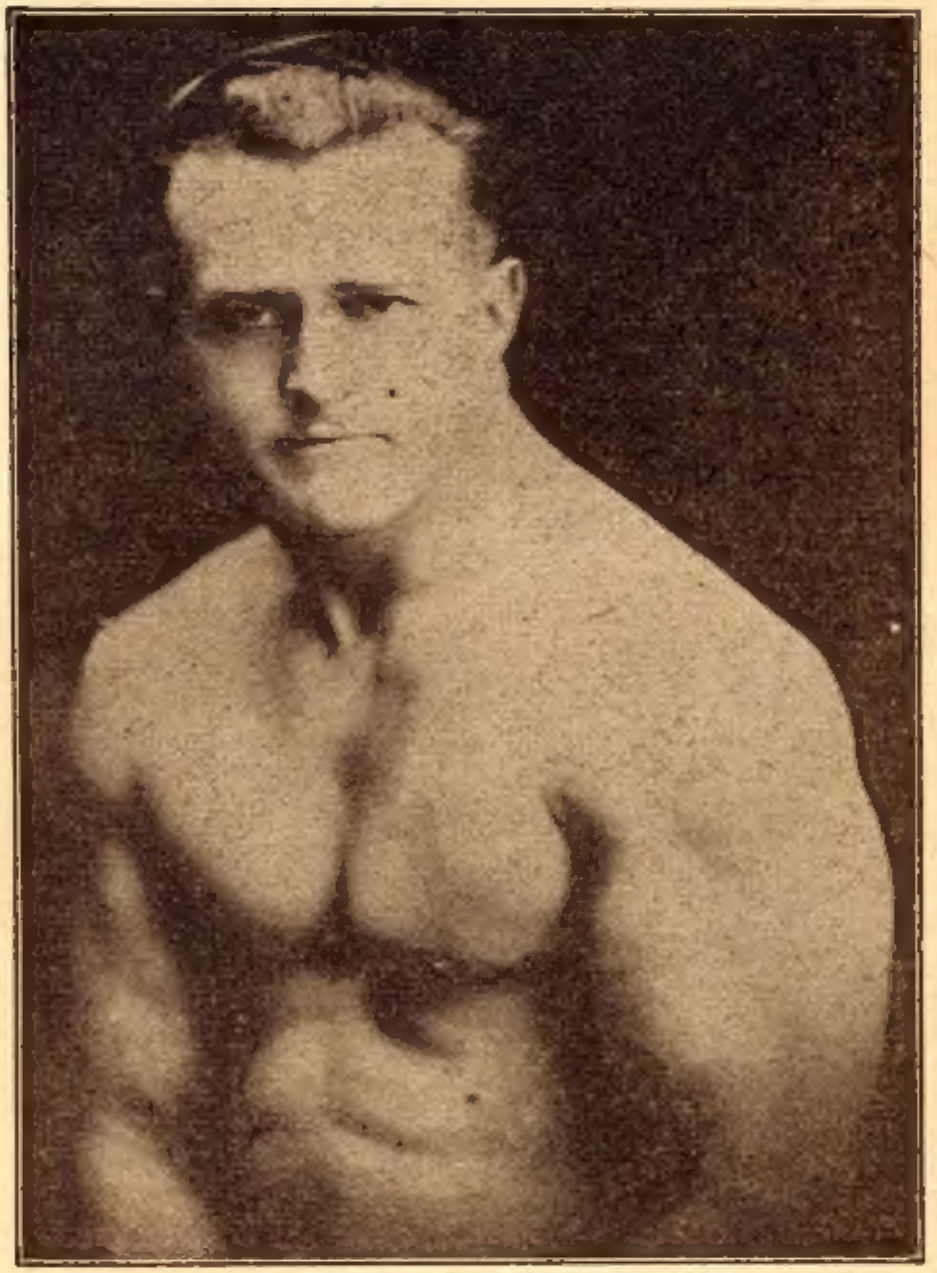
These are the days that call for speed. It once took four weeks to cross the ocean—now it takes less than one. In olden days it took years to develop a strong, healthy body. I can completely transform you in 90 days. Yes, make a complete change in your entire physical make-up. In 30 days I guarantee to increase your biceps one full inch. I also guarantee to increase your chest two inches. But I don't quit there. I don't stop till you're a finished athlete—a real strong man. I will broaden your shoulders, deepen your chest, strengthen your neck. I will give you the arms and legs of a Hercules. I will put an armor plate of muscle over your entire body. But with it come the strong, powerful lungs which enrich the blood, putting new life into your entire being. You will be bubbling over with strength, pep and vitality.

A Doctor Who Takes His Own Medicine

Many say that any form of exercise is good, but this is not true. I have seen men working in the factories and mills who literally killed themselves with exercise. They ruined their hearts or other vital organs, ruptured themselves or killed off what little vitality they possessed.

I was a frail weakling myself in search of health and strength. I spent years in study and research, analyzing my own defects to find what I needed. After many tests and experiments, I discovered a secret of progressive exercising. I increased my own arms over six and a half inches, my neck three inches and other parts of my body in proportion. I decided to become a public benefactor and impart this knowledge to others. Physicians and the highest authorities on physical culture have tested my system and pronounced it to be the surest means of acquiring perfect manhood. Do you crave a strong, well proportioned body and the abundance of health that goes with it? Are you true to yourself? If so, spend a pleasant half hour in learning how to attain it. The knowledge is yours for the asking.



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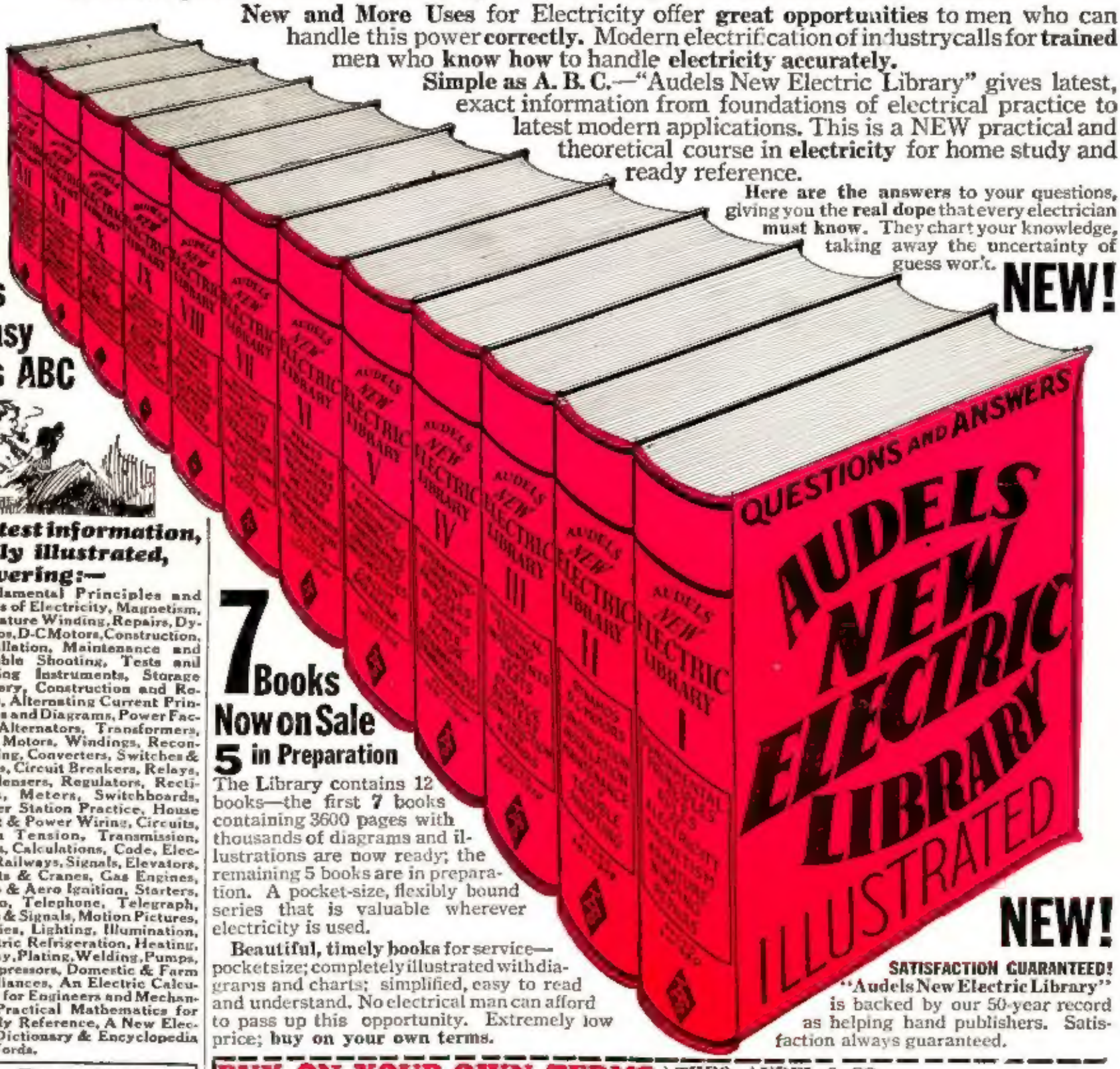

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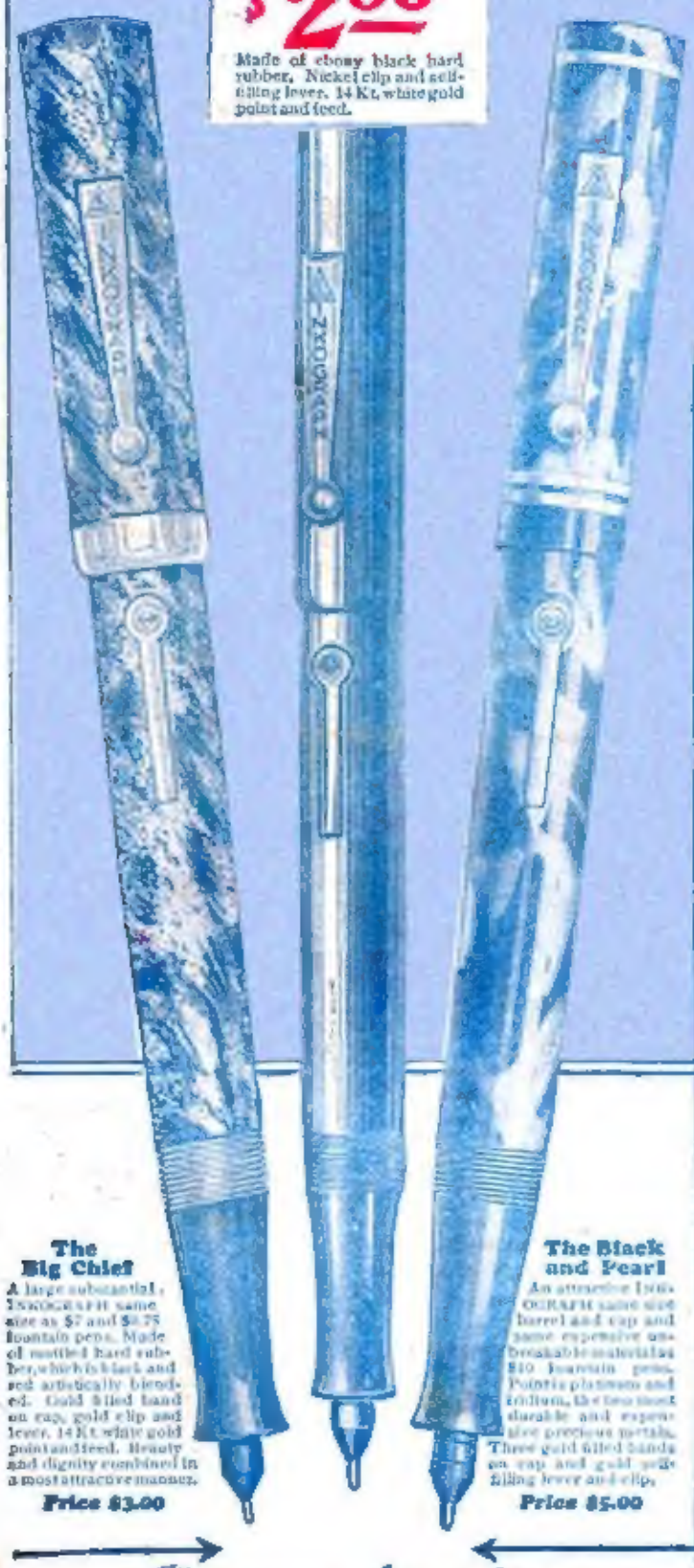

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